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PART I

Family PENAEIDAE Spence Bate

The *Penaeidae*[1]) collected by the Siboga Expedition ought to be considered as a most valuable contribution to our knowledge of these interesting animals and to the Fauna of the East Indian Archipelago. No less than 54 species and 2 varieties have been collected and of the species 19 or 20 proved to be new to science. Of the 34 or 35 already known species only 13 or 14 have been observed formerly in this Archipelago.

The deep-sea investigations especially have been of great importance. A rather large number of species, viz. about 24, have been captured in the great depths and abysses of the sea, but of these species only 3 were already known to occur in the Archipelago, viz. *Aristeus semidentatus* (Sp. Bate), *Haliporus neptunus* Sp. Bate and *Haliporus Lucasii* (Sp. Bate), species collected formerly by the "Challenger". The genus *Benthesicymus* Sp. Bate is only represented by one species, but of the remarkable genus *Gennadas* Sp. Bate two species were obtained, both new to science; no species of *Gennadas* were hitherto known from the Archipelago, except *Genn. Bouvieri* Kemp, described only in 1909, a form observed West of Manila at 2100 fathoms and North of New Guinea at 1100 fathoms. Of the new *Hemipenaeus Sibogae* a fine full-grown female was collected at a depth of 1000 meter. Very remarkable is the discovery of the new *Haliporus Sibogae*, a species living at depths between 400 and 521 meters, and of which at four Stations more than 50 well preserved specimens, mostly adult, were captured: this interesting species belongs to the largest representatives of this genus, the male attaining a length of 165 mm., while the female becomes 175 mm. long. *Halip. Sibogae* appertains to a Section, that hitherto was still unknown in the Indopacific.

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1) The elaboration of the extensive Collections of Decapoda obtained by the "Siboga" will still take up a long time before its completion. With Professor MAX WEBER's permission, the author has therefore determined on publishing already now the present manuscript, in which the Families of the *Penaeidae* and *Alpheidae* have been worked out. Soon afterwards some Families of *Reptantia* will follow. [The figures illustrating the described species will be published later on. The species of which figures will be given are marked with †].

Diagnoses of the new Species of both Families have already been published in the "Notes from the Leyden Museum, Vol. XXIX, 1907, p. 130—147 and Vol. XXX, 1908, p. 98—112, as also in the: Tijdschrift Nederl. Dierk. Vereeniging, (2) Dl. XI, p. 99—125, 1909 and p. 287—319, 1910.

Very interesting also are the two new species of the remarkable genus *Solenocera*, especially *Sol. Melantho*, numerous specimens of which were obtained at a moderate depth, from 216 to 274 meters.

The genus *Penaeopsis* A. M.-Edw., with which *Metapenaeus* W.-Mas. is identical, comprises at present no less than 50 species and 2 varieties, and of these species 44 and 1 variety occur in the Indopacific. It is often difficult to distinguish these species and of a part the distribution seems to be rather limited. It is probably owing to the limited range of many of these forms, that hardly more than one-fourth of the total number of known indopacific species was captured by this Expedition; of the 13 species 5 or 6 are new. Of the new *Penaeopsis Sibogae* 21 specimens were collected at the Stations 306 and 312 in water of 247 and 274 meters; this species bears a close resemblance to *Penaeopsis coniger* (W.-Mas.), and its variety *andamanensis* (W.-Mas.). Of the 13 species that were collected, only 2 were already known to occur in the Archipelago. *Penaeopsis stridulans* (W.-Mas.) is noteworthy by the stridulating organ, that is situated on each side of the carapace near the middle of the posterior end of the branchiostegite; this organ, however, has also been observed by the author of this Report in two japanese species, *Penaeopsis barbatus* (de Haan), with which *Penaeopsis akayebi* (Rathb.) is identical, and in *Penaeopsis acclivis* (Rathb.). This *Penaeopsis stridulans*, of which at 18 various Stations more than 50 specimens were collected, was not yet known to occur in the East Indian Archipelago. The 4 known indopacific species of the genus *Parapenaeus* S. I. Smith have all been obtained. Of the genus *Atypopenaeus*, of which only one species was known, a second was discovered at a moderate depth. Also one new species of *Trachypenaeus* was discovered, while *Trachyp. anchoralis* of the Challenger Expedition was taken.

The genus *Parapenaeopsis* W.-Mas. is only known from the Indopacific and comprises 11 species and 3 varieties; 2 species were obtained, one of which is new, but *Parap. sculptilis* (Heller) from the Java Sea was not observed. Of the genus *Penaeus* s. s., represented at present in the Indopacific by 13 species and 3 varieties, 6 species and 1 variety were collected. Four well preserved, adult females of *Pen. carinatus* Dana were captured off Makassar, a species that, according to Professor ALCOCK, attains a length of at least a foot, and near the island of Saleyer five females of *Pen. indicus* H. M.-Edw., var. *longirostris* de Man were taken; this interesting variety was discovered by Professor MAX WEBER at Makassar during his first Expedition to the Archipelago in 1888—1889.

The genus *Sicyonia* H. M.-Edw., hitherto represented by 16 species and 1 variety, half of which species occur in the Indopacific, was increased by 4 new forms and the total number of species collected was no less than 9. Two new species, *Sic. benthophila* and *Sic. fallax*, were taken at depths of 304 and 275 meters, but the others were captured in rather shallow water and *Sic. bispinosa* de Haan was even taken at the surface. Except *Sic. furcata* Miers, from the Sulu Islands, only one species of *Sicyonia* was known to occur in the Archipelago, viz. *Sic. lancifer* (Oliv.), that was collected by the "Challenger" in the Arafura Sea. The species of this genus seem to be rather rare, for, *Sic. parvula* excepted, the other eight are represented in the Collection only by one or two specimens.

Several species of *Penaeidae*, however, that have already been recorded from the

Archipelago, were not collected by this Expedition, e. g. the remarkable *Heteropenaeus longimanus* de Man, that was discovered in the Java Sea. The names of these species are mentioned in the following List, together with the names of some others that are known from the neighbouring seas, and that therefore probably must be regarded to belong also to the Fauna of the Archipelago.

Benthesicymus altus Sp. Bate	Between Australia and New Guinea; South of
Benthesicymus brasiliensis Sp. Bate	Near Torres Strait. [the Philippines.
Benthesicymus pleocanthus Sp. Bate	Philippine Islands.
Gennadas Bouvieri Kemp	West of Manila; North of New Guinea.
Hemipenaeus spinidorsalis Sp. Bate	Near the Philippines.
Hemipenaeus gracilis Sp. Bate	Off Tablas Island, Philippines.
Haliporus laevis Sp. Bate	Off Manila, Philippines.
Penaeopsis avirostris (Dana)	East Indian Archipelago (Singapore).
Penaeopsis brevicornis (H. M.-Edw.)	East Indian Archipelago (Java Sea).
Penaeopsis incisipes (Sp. Bate)	Arafura Sea; Off Panay, Philippine Islands.
Penaeopsis gracilis (Dana)	Sulu Sea.
Penaeopsis philippinensis (Sp. Bate)	Off the Kei Islands; Celebes.
Penaeopsis Batei (Miers)	Albany Island.
Trachypenaeus granulosus (Hasw.)	Torres Strait.
Parapenaeopsis gracillima Nob.	Buntal (Borneo).
Parapenaeopsis sculptilis (Heller)	Java.
Penaeus gracilirostris Thallw.	North Celebes.
Penaeus indicus H. M.-Edw.	Singapore, Java.
Heteropenaeus longimanus de Man	Java Sea.
Sicyonia furcata Miers	Sulu Islands.

The total number of species of *Penaeidae*, known up to the present time to be distributed through the East Indian Archipelago, therefore amounts to about seventy.

TABLE indicating the total number of known species of *Penaeidae*, of the indopacific species, of the species occurring both in the Atlantic and in the Indopacific, of the species collected by the "Siboga" and of the new species.

	Total number of known species	Total number of indopacific spec. [1])	Total number of species occurring both in the Atlantic and in the Indopacific	Total number of species collected by the "Siboga".	Total number of new species
Benthesicymus Sp. Bate	13	4	4 or 5	1	0
Benthonectes S. I. Smith	1	0	0	0	0
Gennadas Sp. Bate	15	7	1	2	2
Aristeomorpha W.-Mas.	2	1	0	0	0
Hepomadus Sp. Bate	3	1	1 or 2	0	0
Aristeopsis Alcock	1 and 1 var.	1	1	0	0
Plesiopenaeus Sp. Bate	2	1	1	0	0
Hemipenaeus Sp. Bate	7	4	1	2	1
Aristeus Duv.	5	2	0	2	0
Haliporus Sp. Bate	23	10	2	6	2
Parasolenocera W.-Mas.	2	2	0	0	0
Solenocera H. Luc.	9	7	0	3	2
Funchalia J. Y. Johnson	1	0	0	0	0
Penaeopsis A. M.-Edw.	50 and 2 var.	44 and 1 var.	1	13 and 1 var.	5 or 6
Parapenaeus S. I. Smith	8	4	0	4	0
Atypopenaeus Alcock	2	2	0	2	1
Trachypenaeus Alcock	6 and 1 var.	5	0	2	1
Xiphopenaeus S. I. Smith	2	0	0	0	0
Parapenaeopsis W.-Mas.	11 and 3 var.	11 and 3 var.	0	2	1
Penaeus Fabr. s. s.	21 and 4 var.	13 and 3 var.	0	6 and 1 var.	0
Heteropenaeus de Man	1	1	0	0	0
Artemesia Sp. Bate	2	0	0	0	0
Sicyonia H. M.-Edw.	20	12	0	9	4
Sicyonella Borr.	1	1	0	0	0
Synhimantites Dan.	1	0	0	0	0
Total	209 and 11 var.	133 and 7 var.	12 or 14	54 and 2 var.	19 or 20

1) The species recorded from the West Coast of America are not included.

LIST OF ALL THE SPECIES OF PENAEIDAE, KNOWN AT PRESENT, SEPTEMBER 1910 [1]).

I. Subfamily ARISTEINAE Alcock.

I. Genus **Benthesicymus** Sp. Bate.

altus Sp. Bate 1881	Atlantic, Indopacific.
armatus MacGilchr. 1905	Arabian Sea.
Bartletti S. I. Smith 1882	Atlantic, Indopacific.
brasiliensis Sp. Bate 1881	Atlantic, Indopacific.
crenatus Sp. Bate 1881	Mid-Pacific.
*Investigatoris A. And. 1899	Indopacific.
iridescens Sp. Bate 1881	Tristan da Cunha.
laciniatus Rathb. 1906	Hawaiian Islands.
longipes Bouv. 1906	Cape Verde Islands.
mollis Sp. Bate 1888	Tristan da Cunha.
moratus S. I. Smith 1884	Atlantic; Hawaiian Isl.?
pleocanthus Sp. Bate 1888	Atlantic, Indopacific.
Tanneri Fax. 1893	West coast Central America.

II. Genus **Benthonectes** S. I. Smith.

filipes S. I. Smith 1884	East coast United States.

III. Genus **Gennadas** Sp. Bate.
(*Amalopenaeus* S. I. Smith).

Alicei Bouv. 1906	Tropical and subtropical Atlantic.
borealis Rathb. 1902	North Pacific.
Bouvieri Kemp 1909	Indopacific.
Calmani Kemp 1909	South of Japan.
carinatus S. I. Smith 1884	Atlantic, Indopacific.
***clavicarpus** de Man 1907	East Indian Archipelago.
elegans S. I. Smith 1882	Atlantic, Mediterranean.
intermedius Sp. Bate 1888	Atlantic.

1) The species collected by the "Siboga" are marked with an asterisk and the new species are printed in a more heavy type.

parvus Sp. Bate 1881 . . . . . Japan.
*Pasithea de Man 1907 . . . . . East Indian Archipelago.
propinquus Rathb. 1906 . . . . . Hawaiian Islands.
scutatus Bouv. 1906 . . . . . Atlantic.
Talismani Bouv. 1906. . . . . Cape Verde Islands.
Tinayrei Bouv. 1906 . . . . . Atlantic.
valens S. I. Smith 1884 . . . . . Atlantic.
sp. Faxon 1895 . . . . . West coast Central America.
sp. Rathbun 1906 . . . . . Hawaiian Islands.

IV. Genus **Aristeomorpha** W.-Mas.

foliacea (Risso) 1826 . . . . . Mediterranean, East Atlantic.
rostridentata (Sp. Bate) 1881 . . . . . Indopacific.

V. Genus **Hepomadus** Sp. Bate.

glacialis Sp. Bate 1881 . . . . . Atlantic, Indopacific.
inermis Sp. Bate 1881 . . . . . South Pacific.
tener S. I. Smith 1884 . . . . . East coast America; Bay of Bengal?

VI. Genus **Aristeopsis** Alcock.

armatus Sp. Bate 1881 . . . . . Atlantic, Indopacific.
armatus Sp. Bate, var. tridens S. I. Smith 1884 . . . Atlantic.

VII. Genus **Plesiopenaeus** Sp. Bate.

coruscans W.-Mas. 1891 . . . . . Bay of Bengal.
Edwardsianus J. Y. Johnson 1867 = Aristeus splendens
J. Rich. 1903 (teste E. L. Bouvier in litt.) . . . . Atlantic, Indopacific.

VIII. Genus **Hemipenaeus** Sp. Bate.

Carpenteri W.-Mas. 1891. . . . . Indopacific.
*crassipes W.-Mas. 1891 . . . . . Indopacific.
gracilis Sp. Bate 1888. . . . . Indopacific.
speciosus Sp. Bate 1881 . . . . . South Atlantic.
spinidorsalis Sp. Bate 1881 . . . . . Atlantic, Indopacific.
Triton Fax. 1893 . . . . . West coast Central America.
*Sibogae n. sp. 1910 . . . . . East Indian Archipelago.

IX. Genus **Aristeus** Duv.

antennatus (Risso) 1816 . . . . . Mediterranean, East Atlantic.
antillensis Bouv. 1909. . . . . Antilles.
occidentalis Fax. 1893 . . . . . West coast Central America.
*semidentatus Sp. Bate 1881 . . . . . Indopacific.
*virilis Sp. Bate 1881 = tomentosus Sp. Bate 1881. . . Indopacific.

II. Subfamily PENAEINAE Alcock.

X. Genus **Haliporus** Sp. Bate.

*aequalis Sp. Bate 1888	Indopacific.
affinis Bouv. 1906	Atlantic.
androgynus Bouv. 1906	Tropical and subtropical Atlantic.
curvirostris Sp. Bate 1881	Mid- and South Pacific.
debilis S. I. Smith 1882	Tropical and subtropical Atlantic.
diomedeae Fax. 1893	West coast Central America.
Doris Fax. 1893	West coast Central America.
laevis Sp. Bate 1881	East Atlantic; Indopacific.
*Lucasii Sp. Bate 1881	Indopacific.
malhaensis Borr. 1910	Western Indian Ocean.
microps S. I. Smith 1884	West Atlantic; Indopacific.
modestus S. I. Smith 1885	East coast United States.
Mülleri (Sp. Bate) 1888	East coast of South America.
*neptunus Sp. Bate 1881	Indopacific.
Nereus Fax. 1893	West coast Central America.
*obliquirostris Sp. Bate 1881	Indopacific.
***propinquus** de Man 1907	East Indian Archipelago.
robustus S. I. Smith 1885	West Indies.
***Sibogae** de Man 1907	East Indian Archipelago.
taprobanensis A. And. 1899	Indopacific.
Thetis Fax. 1893	West coast Central America.
tropicalis Bouv. 1905	West Indies.
villosus A. And. 1894	Arabian Sea.

XI. Genus **Parasolenocera** W.-Mas.

annectens W.-Mas. 1891	Andaman Sea.
maldivensis Borr. 1910	Western Indian Ocean.

XII. Genus **Solenocera** H. Luc.

Agassizii Fax. 1893	West coast Central America.
crassicornis H. M.-Edw. 1837	Indopacific.
distincta (de Haan) 1849	Japan.
***Faxoni** de Man 1907	East Indian Archipelago.
Hextii W.-Mas. 1891	Arabian Sea, Bay of Bengal.
Koelbeli n. nom. 1910 = distincta Koelbel 1894	Japan.
***Melantho** de Man 1907	East Indian Archipelago.
membranacea H. M.-Edw. 1837	Mediterranean, Atlantic.
*pectinata Sp. Bate 1888 = cervicalis Zehntner 1894	Indopacific.
*sp. de Man 1910	East Indian Archipelago.

XIII. Genus **Funchalia** J. Y. Johnson.

Woodwardi J. Y. Johnson 1867	Madeira and Azores.

XIV. Genus **Penaeopsis** A. M.-Edw.

A. Telson without marginal spines.

*affinis H. M.-Edw. 1837	Indopacific.
avirostris Dana 1852	Indopacific.
brevicornis H. M.-Edw. 1837	Indopacific.
Deschampsi Nob. 1903	Indopacific.
Dobsoni Miers 1878	Indopacific.
*elegans de Man 1907	Indopacific.
incisipes Sp. Bate 1888	Indopacific.
Joyneri Miers 1880	Japan.
Lysianassa de Man 1888	Coasts of India, Bay of Bengal.
Mastersi Hasw. 1882	East coast of Australia.
*monoceros Fabr. 1798	Indopacific.
mutatus Lanch. 1901	Malay Peninsula.
? villosus Guérin 1829	Australia.
sp. Lanchester 1901	Patani (Malay Peninsula).
*sp. de Man 1910	Makassar.

B. Telson with marginal spines.

acclivis Rathb. 1902	Indopacific.
barbatus de Haan 1849 = akayebi Rathb. 1902	Japan.
Batei Miers 1884	Albany Island.
*Borradailei n. sp. 1910	East Indian Archipelago.
*Challengeri nov. nom. 1910 = serratus (Sp. Bate) 1888	Indopacific.
cognatus Nob. 1904	Djibouti.
commensalis Borr. 1898	Rotuma.
coniger W.-Mas. 1891	Coast of India, Bay of Bengal.
*coniger W.-Mas., var. andamanensis W.-Mas. 1891	Indopacific.
consobrinus Nob. 1904	Djibouti.
Dalei Rathb. 1902	Indopacific.
*distinctus de Man 1907	East Indian Archipelago.
ensis de Haan 1849	Japan.
*Evermanni Rathb. 1906	Indopacific.
gallensis Pears. 1905	Ceylon.
Goodei S. I. Smith 1885	East and west coast of tropical America.
gracilis Dana 1852	Sulu Sea.
*hilarulus n. sp. 1910	East Indian Archipelago.
intermedius Kish. 1900	Japan.
Kishinouyei Rathb. 1902	Galapagos Islands.
lamellatus de Haan 1849	Japan.
longipes (Paulson) 1875	Red Sea.
Macleayi Hasw. 1902	Port Jackson.
megalops S. I. Smith 1885	Caribbean Sea.
mogiensis Rathb. 1902	Indopacific.
palmensis Hasw. 1882	Palm Island.
perlarum Nob. 1905	Persian Gulf.
philippii Sp. Bate 1881	Philippine Islands.
philippinensis Sp. Bate 1888	Indopacific.
pubescens Stimps. 1874	West Indies; East Atlantic?
*quinquedentatus de Man 1907	East Indian Archipelago.
*Richtersi Miers 1884	Indopacific.

serratus A. M.-Edw. 1881 . . . . . Atlantic, north of the Equator.
serratus A. M.-Edw., var. antillensis Bouv. 1909 . . . Antilles.
*Sibogae de Man 1907. . . . . East Indian Archipelago.
Stebbingii Nob. 1904 . . . . . Red Sea.
*stridulans W.-Mas. . . . . Indopacific.
Vaillanti Nob. 1904 . . . . . Red Sea.
velutinus Dana 1902 . . . . . Hawaiian Islands.

XV. Genus **Parapenaeus** S. I. Smith.

americanus Rathb. 1901 . . . . . Porto Rico.
*fissurus (Sp. Bate) 1881 . . . . . Indopacific.
*Investigatoris A. And. 1899 . . . . . Indopacific.
*longipes Alcock 1905 . . . . . Indopacific.
longirostris (H. Luc.) 1849 . . . . . Mediterranean, East Atlantic North of the
paradoxus Bouv. 1905. . . . . West Indies. [Equator.
politus S. I. Smith 1881. . . . . East Coast United States; Gulf of Paria.
*rectacutus (Sp. Bate) 1881 . . . . . Indopacific.

XVI. Genus **Atypopenaeus** Alcock.

*compressipes (Hend.) 1893 . . . . . Indopacific.
*dearmatus de Man 1907. . . . . East Indian Archipelago.

XVII. Genus **Trachypenaeus** Alcock.

*anchoralis (Sp. Bate) 1888 . . . . . Indopacific.
asper Alcock 1905 . . . . . Bay of Bengal.
constrictus (Stimps.) 1871 . . . . . East coast of N. America; West-Indies.
constrictus (Stimps.), var. similis S. I. Smith 1885. . . West Indies.
curvirostris (Stimps.) 1860 . . . . . Japan.
granulosus (Hasw.) 1882 . . . . . Torres Strait.
*salaco de Man 1907 . . . . . East Indian Archipelago.

XVIII. Genus **Xiphopenaeus** S. I. Smith.

Kröyeri (Heller) 1862 . . . . . East coast South America.
Riveti Bouv. 1907 . . . . . Peru.

XIX. Genus **Parapenaeopsis** W.-Mas.

acclivirostris Alcock 1905 . . . . . Coasts of India.
*cornuta (Kish.) 1900 . . . . . Indopacific.
gracillima Nob. 1903 . . . . . Buntal (Borneo).
Hungerfordi Alcock 1905 . . . . . Hongkong.
maxillipedo Alcock 1905. . . . . Coasts of India.
nana Alcock 1905 . . . . . Coasts of India.
sculptilis (Heller) 1862 . . . . . Indopacific.
sculptilis (Heller), var. cultrirostris Alcock 1906 . . . Bay of Bengal.
sculptilis (Heller), var. Hardwickii Miers 1878 . . . . Bay of Bengal.
stylifera (H. M.-Edw.) 1837. . . . . West coast of India; Palk Strait.
stylifera (H. M.-Edw.), var. coromandelica Alcock 1906 . East coast of India.
tenella (Sp. Bate) 1888 = crucifera Ortm. 1890. . . . Japan.
uncta Alcock 1905 . . . . . East coast of India.
*venusta de Man 1907. . . . . East Indian Archipelago.

XX. Genus **Penaeus** Fabr. s. s.

balboae Fax. 1893	West coast of Central America.
brasiliensis Latr. 1817	West and East Atlantic.
brasiliensis Latr., var. Aztecus Ives 1891	Vera Cruz.
brevirostris Kingsley 1878	West coast of America.
californiensis Holmes 1901	California.
*canaliculatus (Oliv.) 1811	Indopacific.
caramote (Risso) 1816 = trisulcatus Leach 1815	Mediterranean and East Atlantic.
*carinatus Dana 1852	Indopacific.
caeruleus Stebbing 1905	Nahoon river, near East London.
esculentus Hasw. 1882	East coast of Australia.
gracilirostris Thallw. 1891	North Celebes.
indicus H. M.-Edw. 1837	Western Indopacific.
*indicus H. M.-Edw., var. longirostris de Man 1892	East Indian Archipelago.
indicus H. M.-Edw., var. penicillatus Alcock 1905	Bay of Bengal.
*japonicus Sp. Bate 1881	Indopacific.
*latisulcatus Kish. 1900	Indopacific.
marginatus Rand. 1839	Hawaiian Islands.
*merguiensis de Man 1888	Indopacific.
monodon (Fabr.) Alcock 1905	Coasts of India.
occidentalis Streets 1871	Panama.
plebejus Hess 1865	Port Jackson.
*semisulcatus de Haan 1849 = ashiaka Kish. 1900	Indopacific.
semisulcatus de Haan, var. exsulcatus Hilgd. 1878	Quellimane.
setiferus L. = fluviatilis Say 1817	West Atlantic.
stylirostris Stimps. 1874	Panama.

XXI. Genus **Heteropenaeus** de Man.

longimanus de Man 1896	East Indian Archipelago.

XXII. Genus **Artemesia** Sp. Bate.

brevinaris Nob. 1901	South Atlantic.
longinaris Sp. Bate 1888	South Atlantic.

III. Subfamily SICYONINAE Ortm.

XXIII. Genus **Sicyonia** H. M.-Edw.

affinis Fax. 1893	West coast of tropical America.
*benthophila de Man 1907	East Indian Archipelago.
*bispinosa de Haan 1849	Japan; East Indian Archipelago.
brevirostris Stimps. 1874	East Atlantic, North of the Equator.
carinata Olivi 1792	Mediterranean and East Atlantic, North of the Equator.
carinata Olivi, var. americana de Man 1907	Bahia.
cristata de Haan 1849	Japan; Ceylon?
dorsalis Kingsley 1878	West Indies.
Edwardsi Miers 1881 = carinata H. M.-Edw. 1830, nec Olivi.	Tropical West Atlantic.

*fallax de Man 1907	East Indian Archipelago.
furcata Miers 1878	Sulu Islands.
laevigata Stimps. 1874	West Atlantic, North of the Equator.
*laevis Sp. Bate 1881	Indopacific.
*lancifer (Oliv.)	Indopacific.
longicauda Rathb. 1906	Hawaiian Islands.
*ocellata Stimps. 1860	Indopacific.
*parvula de Haan 1849	Indopacific.
penicillata Lock. 1878.	California.
picta Fax. 1893	West coast of Central America.
*rectirostris de Man 1907.	East Indian Archipelago.
*trispinosa de Man 1907	East Indian Archipelago.
sp. Haswell 1882	Port Denison.
sp. Haswell 1882	Port Jackson.

XXIV. Genus **Sicyonella** Borr.

maldivensis Borr. 1910	Western Indian Ocean.

XXV. Genus **Synhimantites** Dan.

typicus Dan. 1863	Norway.

XXVI. Species the systematic position of which is doubtful.

"Hemipenaeus dubius" Sp. Bate 1881	Philippine Islands.
"Penaeus Novae-Guineae" Hasw. 1882.	New Guinea.
"Penaeus Orbignyanus" Latr.	West Coast of France.
"Penaeus planicornis" Fabr. 1798	Indian Ocean.
"Penaeus podophthalmus" Stimps. 1860	Hongkong.
"Penaeus stenodactylus" Stimps. 1860	Hongkong.
"Penaeus tahitensis" Heller 1865.	Tahiti.
"Penaeus telsodecacanthus" Sp. Bate 1881	Japan.
"Penaeus tenuis" Dana 1852	Patagonia.

LIST OF THE 54 SPECIES AND 2 VARIETIES, COLLECTED BY THE "SIBOGA".

The new species are marked with an asterisk.

Benthesicymus Investigatoris A. And.
**Gennadas Pasithea* de Man.
**Gennadas clavicarpus* de Man.
Hemipenaeus crassipes (W.-Mas.).
**Hemipenaeus Sibogae* n. sp.
Aristeus virilis (Sp. Bate).
Aristeus semidentatus (Sp. Bate).
Haliporus aequalis Sp. Bate.
**Haliporus propinquus* de Man.
Haliporus obliquirostris Sp. Bate.
Haliporus neptunus Sp. Bate.
**Haliporus Sibogae* de Man.
Haliporus Lucasii (Sp. Bate).
Solenocera pectinata (Sp. Bate).
Solenocera sp. [1])
**Solenocera Melantho* de Man.
**Solenocera Faxoni* de Man.
Penaeopsis monoceros (Fabr.).
Penaeopsis affinis (H. M.-Edw.).
**Penaeopsis elegans* (de Man).
Penaeopsis sp.
Penaeopsis coniger (W.-Mas.), var. *andamanensis* (W.-Mas.).
**Penaeopsis Sibogae* (de Man).
Penaeopsis Richtersii (Miers).
Penaeopsis stridulans (W.-Mas.).
**Penaeopsis distinctus* (de Man).
Penaeopsis sp. (*hilarulus* n. sp.?)
**Penaeopsis quinquedentatus* (de Man).
**Penaeopsis Borradailei* n. sp.
Penaeopsis Evermanni (Rathb.).
Penaeopsis Challengeri n. nom.
Parapenaeus fissurus (Sp. Bate).
Parapenaeus Investigatoris A. And.
Parapenaeus longipes Alcock.
Parapenaeus rectacutus (Sp. Bate).
Atypopenaeus compressipes (Hend.).
**Atypopenaeus dearmatus* de Man.
Trachypenaeus anchoralis (Sp. Bate).
**Trachypenaeus salaco* de Man.
Parapenaeopsis cornuta (Kish.).
**Parapenaeopsis venusta* de Man.
Penaeus semisulcatus de Haan.
Penaeus carinatus Dana.
Penaeus indicus H. M.-Edw., var. *longirostris* [de Man.
Penaeus merguiensis de Man.
Penaeus canaliculatus Oliv.
Penaeus japonicus Sp. Bate.
Penaeus latisulcatus Kish.
**Sicyonia benthophila* de Man.
**Sicyonia fallax* de Man.
**Sicyonia rectirostris* de Man.
Sicyonia parvula de Haan.
Sicyonia laevis Sp. Bate.
Sicyonia bispinosa de Haan.
Sicyonia ocellata Stimps.
**Sicyonia trispinosa* de Man.
Sicyonia lancifer (Oliv.).

1) The unnamed *Solenocera* is not considered as a proper species.

Subfamily Aristeinae Alcock.

Benthesicymus Sp. Bate.

The genus *Benthesicymus* includes at present 13 species, 3 or 4 of which are confined to the Atlantic. *Benth. iridescens* Sp. Bate and *Benth. mollis* Sp. Bate are only known from the island of Tristan da Cunha, *Benth. longipes* Bouv. has been recorded from the Cape Verde Islands, the fourth finally, *Benth. moratus* S. I. Smith, does not only occur on the east coast of the United States and near the Tortugas, but also on the coast of Morocco and off the Cape Verde Islands, while it has even been recorded by Miss Rathbun from the Hawaiian Islands. Four other species are not only found in the Atlantic, but also in the Indopacific. These species are 1° *Benth. Bartletti* S. I. Smith, which is distributed from Nova Scotia to the Gulf of Mexico and the Cape Verde Islands, but which, according to Col. Alcock, occurs also in the Bay of Bengal, 2° *Benth. altus* Sp. Bate, known from the Kermadec, the Philippine and the Fiji Islands and from Japan, but which Spence Bate also records from Tristan da Cunha, 3° *Benth. pleocanthus* Sp. Bate, a species observed not only in the North Pacific and off the Philippines, but also off Sombrero Island, one of the Antilles and, finally, 4° *Benth. brasiliensis* Sp. Bate, known not only from the east coast of Brazil, but also from the South Pacific, Torres Strait, New Zealand, the Fiji Islands etc. *Benth. Tanneri* Fax. is distributed from California to Ecuador and the Galapagos Islands, while the four remaining species are confined to the Indopacific. Of the latter *Benth. laciniatus* Rathb. has been taken near the Hawaiian Islands and *Benth. crenatus* Sp. Bate in the Low Archipelago; *Benth. Investigatoris* A. And. was captured by the "Investigator" in the Andaman Sea and in the Gulf of Manár, while it has been dredged off Saya de Malha, but this species occurs also near the Hawaiian Islands, the fourth, *Benth. armatus* MacGilchrist, inhabits the Arabian Sea.

Only one species, viz. *Benth. Investigatoris*, has been taken by the "Siboga", but two other ones, viz. *Benth. altus* Sp. Bate and *Benth. brasiliensis* Sp. Bate, will probably once prove to be also inhabitants of the East Indian Archipelago.

All the species of *Benthesicymus* are truly abyssal, inhabiting the great depths of the Oceans. The greatest depth at which this genus has been observed, is that of 3050 fathoms in the North Pacific (*Benth. pleocanthus*), but the same species was taken near the Philippine Islands at 1050 fathoms and off Sombrero Island in water of 450 fathoms. This great variability as regards the vertical distribution has also been observed in some other species of this genus.

† 1. *Benthesicymus Investigatoris* A. And.

A. Alcock and A. R. S. Anderson, Ann. Mag. Nat. Hist. Ser. 7, Vol. III, April 1899, p. 282.
A. Alcock, Indian Deep-Sea Crustacea, Decapoda Macrura and Anomala, 1901, p. 44.
—— Illustrations of the Zoology of the Investigator, Crustacea, Pl. XLI, Fig. 2, 1899.
M. J. Rathbun, Bull. U. S. Fish Comm. for 1903, Wash. 1906, p. 906.

Stat. 161. August 17. 1° 10′.5 S., 130° 9′ E. Halmahera Sea. 798 m. Muddy sand. 1 female.
Stat. 178. September 2. 2° 40′ S., 128° 37′.5 E. Ceram Sea. 835 m. Blue mud. 1 male and 1 female.

These specimens agree very well with Alcock's description and figure, except as regards the thelycum, while the chelate legs appear a little more slender than in the quoted figure of the "Illustrations". According to the original description the thelycum consists "of a tubercle between the 3rd pair of legs followed by two transverse bands lying respectively between the 4th and 5th pairs of legs, the first of these bands being sinuously notched anteriorly, the second being simply notched posteriorly". In the two females captured by the "Siboga", one observes between the coxae of the 3rd legs a triangular tubercle, rounded posteriorly and which is followed by a single plate, somewhat longer than broad, lying between the legs of the 4th and 5th pairs. Anteriorly this plate is emarginate, while the anterior margin projects a little in the middle; the rounded posterior margin is simply notched in the middle and at either side the upper surface is hollowed out or concave, so that this organ appears faintly though obtusely carinate in the mid-line. The coxae of the 4th legs show at the inner side a semicircular, compressed process, fringed with hairs; these processes partly cover the concave lateral sides of the plate.

In the female from Stat. 161 the carapace with the rostrum is 21,5 mm. long, so that this specimen has almost attained the length of 24 mm. indicated by Alcock, but, according to Miss Rathbun, carapace and rostrum attain a length of 32,2 mm.; the two other specimens are of a smaller size, the carapace with the rostrum measuring 18 mm. in the male and 15 mm. in the female. In the male the two branches of the petasma are not yet united.

In these specimens the rather sharp post-rostral crest is produced as far as the deep cervical groove, i. e. the anterior of the two grooves, and posterior to the cervical groove the carapace is rounded. The post-cervical groove extends almost to the upper border of the carapace and is less deep than the cervical. The "very small rudiment of a movable spine, behind the posterior tooth of the rostrum" described by Miss Rathbun (l. c.) seems to have been present also in these specimens, but to be broken off. No hepatic spine. The three anterior abdominal somites are rounded, the 4th bears a distinct carina, that reaches from the posterior extremity to just beyond the middle, but does not terminate posteriorly in a tooth. The rather sharp carinae of the 5th and 6th somites terminate in a tooth, the carina of the 5th extends along the two posterior thirds of the somite. The telson, a little shorter than the 6th somite, is much shorter than the inner lamella of the caudal fan; the strongly tapering telson is rounded on the anterior and slightly flattened on the posterior half; there are probably three pairs of small spinules near the tip.

Eye-peduncles longer than the rostrum, flattened above; tubercle on the inner margin small and acute. In the largest specimen, the female from Stat. 161, the cornea has a rather

dark brown colour and there is a small spot of black pigment on the lower side of the peduncle near the middle of the outer margin; in the specimens from Stat. 178 the cornea shows a much paler, reddish colour, the small spot of black pigment is present and is, in the female, even quite distinct on the upper side of the peduncle.

The thickened basal part of the upper antennular flagellum appears in the male from Stat. 178 just as long as the distance between the tip of the rostrum and the posterior extremity of the post-rostral carina, at the cervical groove, viz. 11 mm.; the rest of the flagella are lost. Antennal scale narrow, pointed.

Remarks. *Benthesicymus Tanneri* Fax. from the Galapagos is closely related, but differs by the post-rostral carina extending farther backward, by the different form of the thelycum, by the broader antennal scales and by the post-cervical groove reaching less far upward (though in the coloured figure of FAXON's paper it attains the median line of the carapace); the petasma is also different, like the shape of the eye-peduncles and the antero-lateral angle of the carapace is acute, while in *Benth. Investigatoris* it is rounded.

General distribution: Andaman Sea (ALCOCK); Gulf of Manár (ALCOCK); off Saya de Malha (BORRADAILE); Hawaiian Islands (RATHBUN).

Gennadas Sp. Bate.

The general distribution of the 15 species of the genus *Gennadas*, that are at present known, is the following. Two species have a very wide range: *Genn. carinatus* S. I. Smith that occurs along the east coast of the United States, has also been observed in the Arabian Sea, near the Laccadive Islands, and *Genn. scutatus* Bouv., a species of which a single adult female was captured between the Azores and New Foundland, but which perhaps also inhabits the Caribbean Sea, should also occur in the North Pacific (vide STANLEY KEMP, in: Proc. Zool. Soc. London, 1909, p. 727). Six species are known to occur in the Atlantic, five of which are recorded from various parts of the North Atlantic, namely *Genn. Alicei* Bouv., *Genn. (Amalopenaeus) elegans* S. I. Smith, *Genn. Talismani* Bouv., *Genn. Tinayrei* Bouv. and *Genn. valens* S. I. Smith, a species probably also appertaining to the genus or subgenus *Amalopenaeus* S. I. Smith; *Genn. elegans* occurs also in the Mediterranean. A sixth species, *Genn. intermedius* Sp. Bate, has been observed off Sierra Leone and off Pernambuco.

The seven other species are exclusively inhabitants of the Indopacific and their distribution appears rather limited. *Genn. borealis* Rathb. has been recorded from the Aleutians and from Kamchatka, *Genn. propinquus* Rathb. is found along the coasts of the Hawaiian Islands, while two species, viz. *Genn. Calmani* Kemp and *Genn. parvus* Sp. Bate have been taken South of Japan.

The two species obtained by the "Siboga" are new to science, but the East Indian Archipelago is moreover inhabited by a third, viz. *Genn. Bouvieri* Kemp, described in 1909 and observed West of Manila and North of New Guinea. Besides *Genn. carinatus* still another species has been recorded by ALCOCK from the Bay of Bengal and the Arabian Sea, under the name of *Genn. parvus*, but it appears to me probable that this species is not identical

with the true japanese *Genn. parvus*, a good and detailed description of which has been published by Mr. STANLEY KEMP.

In his elaborate paper on the Stalk-eyed Crustacea of the West coast of America, Mr. WALTER FAXON records an unnamed species of this genus and another unnamed *Gennadas* has been mentioned by Miss RATHBUN as occurring off the Hawaiian Islands.

As regards the vertical distribution, it is at present known that all the species of this genus are truly abyssal *Penaeidae*, usually living at depths, greater than 1000 m.; from the observations made by several Expeditions Professor BOUVIER deduces that these Penaeids usually do not live on or near the bottom of the sea and that their eggs, being lighter than water, rise to the surface. This would explain the fact that young specimens in different degrees of development have often been taken in rather shallow water.

† 2. *Gennadas Pasithea* de Man.

J. G. DE MAN, Notes from the Leyden Museum, Vol. XXIX, 1907, p. 146.

Stat. 230. November 14. 3° 58′ S., 128° 20′ E. Banda Sea. From a depth of 2000 m. to surface 1 male and 1 female, both apparently adult.

This species, in which the 1st—3rd pereiopods are furnished with a podobranch, really belongs to the genus *Gennadas* and appears related to *Genn. Calmani* Kemp from Japan, to *Genn. borealis* Rathb. from the northwest coast of North America and to *Amalopenaeus elegans* S. I. Smith from the Atlantic.

Male long 41 mm., the female the carapace of which is mutilated, is of a somewhat smaller size.

The carapace of the male, on which the following description is founded, is 12 mm. long, the rostrum included, i. e. two-fifths the length of the abdomen. Except a few setae between the notch at the antero-inferior angle and the carina bounding the antennal groove above, the carapace appears smooth and polished. The slender pointed tip of the lamellar rostrum reaches almost to the middle of 1st joint of the antennular peduncle and of the eye-peduncle, whereas in *Genn. borealis* it reaches sometimes to the cornea. The single, sharp, rostral tooth is situated just above the orbital margin, the gastrofrontal groove runs a little behind that tooth, as in *Genn. borealis*; post-rostral carina prominent, interrupted both by the cervical and by the post-cervical groove and extending along the whole length of the carapace. The post-rostral carina is rather sharper in front of the cervical than posterior to the post-cervical groove; the distance between both grooves, measured dorsally, is hardly one-sixth the distance from the post-cervical groove to the posterior margin of the carapace. The gastro-antennal carina that separates the gastric region from the antennal sulcus, is sharp and is produced without interruption to the posterior margin of the carapace; that part which is situated between the well-cut cervical groove and the post-cervical groove is slightly curved and obtuse, while the posterior part, the cardiaco-branchial ridge, is also obtuse and directed obliquely downward. Branchiostegal spine small, the branchiostegal carina runs at first upward and then curves backward and downward towards the middle of the lower margin of the

carapace; another ridge or carina runs transversely from the middle of the arcuate, horizontal part of the cervical carina towards the middle of the lower margin of the carapace, running partly just near and behind the posterior portion of the branchiostegal carina.

Sixth abdominal somite alone carinate, the carina obtuse and reaching neither to the anterior nor to the posterior extremity of the upper margin; the 6th somite which is 5,8 mm. long and 2,8 mm. wide, is more than twice as long as the 5th which is 2,6 mm. long. The telson that is 4,5 mm. long, i. e. three-fourths the 6th somite, tapers rather strongly and carries at the posterior extremity two small, movable spinules; it is deeply grooved and, as in *Genn. borealis*, there is perhaps a small spinule at the posterior third of the lateral margins; one observes at either side a sharp carina that runs along the total length of the telson. The telson extends just to the middle of the inner lamella of the caudal fan, the outer lamellae are mutilated. Eye-peduncles slightly compressed; tubercle on the middle of the inner margin large, conical and acute; cornea globular, of a pale yellowish red colour, hardly as broad as the distal part of the peduncle; diameter (1 mm.) of the cornea measuring $^1/_{12}$ the length of the carapace; a speck of black pigment on the middle of the outer margin of the peduncle just beyond the level of the conical tubercle.

Spine on the outer margin of 1st joint of antennular peduncle small, not yet reaching to the end of the corneae. Viewed at from above, the 3rd joint of the antennular peduncle appears a little less broad, but about twice as long as the 2nd, while both joints together are as long as the 1st. Thickened basal portion of the upper flagellum barely longer than the 3rd joint, regularly tapering and at the distal end curved outward, the outer side of the basal portion appearing concave; while the basal portions are contiguous, the rest of the flagella are remote from one another.

Basal joint of outer antennae slightly concave above. The antennal scale, 6,3 mm. long to the end of the blade, is a little more than half as long as the carapace, rostrum included; the greatest width near the base is 1,84 mm., the scale being 3,5-times as long as wide. Both the inner and the outer margin are straight and the scale narrows rather moderately, being still 0,82 mm. wide at the level of the base of the distal spine, where it is still almost half as wide as at the level of the greatest width; extremity of the blade oblique and obtuse, reaching beyond the tip of the terminal spine farther than this spine is long.

Mandibular palp reaching almost to the end of the eye-peduncles. Merus of 2nd maxillipeds much broadened, 4 mm. long and a little more than half as wide; anterior prominence rounded, very large, measuring one-third the total length of the joint and but little shorter than wide at its base; exopod reaching a little beyond the merus.

The external maxillipeds that bear a podobranch reach to the end of the 2nd joint of the antennular peduncle and closely resemble those of *Amalopenaeus elegans* Smith. Measured along the straight, outer margin the ischium appears to be 4 mm. long and, being 1,25 mm. wide in the middle, a little more than 3-times as long as wide; the merus, 2,7 mm. long, is just half as wide and measures two-thirds the length of the ischium; the carpus, 2,08 mm. long, nearly half as long as the ischium, seems in a lateral view to thicken slightly distally, being

here 0,5 mm. thick and 0,3 mm. at the base, the greatest thickness being one-fourth its length; the penultimate joint which is just as long as the carpus, appears in a lateral view a little thicker proximally than at the distal extremity. Viewed at from above, the carpus appears broader and shows the same width along its total length: the propodus appears then also wider than in a lateral view, but this joint is suddenly narrowed near the distal extremity. The dactylus is just half as long as the carpus and the spine at the distal end measures two-thirds its length; its form is elongate, rhomboidal, almost half as wide as long, it is twice as wide at the base as at the tip and it is slightly distorted.

In the 1st pair of legs the chela is a trifle longer than the carpus and the carpus measures two-thirds the length of the merus; fingers a trifle shorter than the palm. In the 2nd pair the merus is a little longer than the carpus and the carpus one-third longer than the chela; palm one and a half as long as the fingers. Both the legs of the 1st and of the 2nd pair bear a sharp tooth at base. Merus of 3rd legs a little longer than the carpus, which is almost twice as long as the chela, fingers as long as the palm. In the 4th and in the 5th legs the propodus appears a little shorter than the carpus; the merus of the 4th is one and a half as long as the propodus, but that of the 5th only one-tenth; dactylus one-fifth respectively one-sixth shorter than the propodus.

Measurements of the five pereiopods of the male in millimeters:

	1st leg	2nd leg	3th leg	4th leg	5th leg
Length of the merus	3,3	3,3	4,3	4,95	4,1
Width [1]) of the merus	1,06	0,63	0,38	0,34	0,28
Length of the carpus	2,2	2,8	4	3,5	3,8
Width of the carpus	0,66	0,45	0,25	0,18	0,16
Length of the propodus	.	.	.	3,3	3,7
Width of the propodus	.	.	.	0,16	0,14
Length of the chela.	2,4	2,12	2,25	.	.
Proportion between length and width of the chela.	4,6	4,2	5	.	.
Length of the fingers	1,12	0,85	1,15	.	.
Length of the dactylus.	.	.	.	2,66	3,12
Proportion between the length of the dactylus and its width at the base.	.	.	.	22	25

Petasma large, 4 mm. long and 4,5 mm. broad at its insertion on the pleopods; it is strongly curved. The petasma (the two branches taken together) terminates distally in two large triangular, obtuse lobes, separated by a semicircular, median incision, and two smaller, lateral lobes, separated from the former by a more narrow and deeper notch; each lateral lobe ends in a narrow tooth or spine, that is curved outward and backward and the tip of which is truncate. Behind each lateral lobe one observes on the upper (anterior) surface of the petasma a subacute, depressed, even slightly concave tubercle. At each side of the median line and close to it are two tubercles situated behind one another; the posterior is longer

1) Measured in the middle.

than wide and arcuate above, its outer margins are slightly concave and it narrows distinctly towards the tip; the anterior tubercle is more conical, though obtuse and shorter than the other. The two anterior prominences are thickly covered with microscopical tubercles each of which ends in two small teeth; similar microscopical tubercles also cover the adjacent submedian lobes of the distal border, they here gradually become smaller. Between the anterior and the posterior tubercles the upper surface of the petasma carries at either side a small, compressed, narrow tooth or lobule, with rounded tip and curved forward.

Though the female is much mutilated, the thelycum appears as a horizontal plate between the three posterior pairs of legs; the anterior margin is rounded, like also the less wide posterior and the thelycum shows its greatest width between the legs of the 4th pair; the upstanding, antero-lateral margins are thickened, the upper surface appearing anteriorly concave.

Remarks. *Genn. Pasithea* is closely related to *Amalopenaeus elegans* S. I. Smith. Apart from the generic character — the presence of podobranchs on the three anterior pairs of pereiopods — it is the petasma that has a different form, as also the thelycum; the 2nd antennular article appears in the atlantic species a little shorter and the propodus of the 4th and 5th legs appears slightly longer, according to Bouvier, than the carpus. Probably there are still more differences.

Gennadas Calmani Kemp from Japan is also closely related. In this species, however, the cervical and the post-cervical groove are somewhat farther distant from one another and both are feeble dorsally, not interrupting the post-rostral carina. The antennal scale has a somewhat different form, the carpus of the 3rd pair is four-fifths the length of the merus, while in *Genn. Pasithea* it is comparatively longer, petasma and thelycum, finally, are also differently shaped.

Except the 1st pair of legs, nothing is known about the pereiopods of *Genn. borealis* Rathb.; the chela of the 1st pair seems to be shorter than the carpus (Rathbun, Decapod Crustaceans Northwest Coast of North America, 1904, p. 148, Fig. 89*b*), whereas in *Genn. Pasithea* it is longer than it. Thelycum and petasma are apparently also different.

† 3. *Gennadas clavicarpus* de Man.

J. G. de Man, Notes from the Leyden Museum, Vol. XXIX, 1907, p. 144.

Stat. 128. July 22. 4° 27′ N., 125° 25′.7 E. Celebes Sea. From 700 m. to surface. 1 adult female.
Stat. 141. August 5. 1° 0′.4 S., 127° 25′.3 E. near Batjan. From 1500 m. to surface. 1 very young female.
Stat. 230. November 14. 3° 58′ S., 128° 20′ E. Banda Sea. From a depth of 2000 m. to surface. 5 males and 5 females of different size.

This species also belongs to the genus *Gennadas*, the three anterior legs being provided with a podobranch; the podobranchs are, in this species, not an outgrowth from the base of the epipod, but are inserted close to the latter.

The adult female from Stat. 128 will be first described. Carapace, rostrum included, 9 mm. long, the abdomen 25 mm., total length 34 mm. Looked at from above, the carapace shows its greatest width just in the middle, being here 5 mm. wide and it narrows a little more anteriorly than posteriorly; the carapace presents its greatest height of 5,6 mm. just behind

the post-cervical groove, so that it appears not at all compressed laterally. The rostrum included, the carapace appears a little longer than one-third the length of the abdomen; both the carapace and the abdomen are smooth and polished. The single tooth of the rostrum is situated just behind the orbital margin of the carapace, the rostrum reaches almost to the middle of 1st antennular article and a little beyond the middle of the eye-peduncle; it is directed forward with the pointed tip slightly turned upward. The distance between the dorsal tooth and the tip of the rostrum measures about one-fifth the distance between the tip and the posterior margin of the carapace. The ascending lower margin and the upper margin between the dorsal tooth and the tip are fringed with long, ciliated hairs. Carapace dorsally carinate throughout its length. Both the cervical and the post-cervical groove are deep and very closely approximate dorsally, the distance between the two grooves is just one-fifth the distance from the post-cervical groove to the posterior margin of the carapace. (In younger specimens the two grooves are comparatively less approximate dorsally, the proportion between the two distances being $4^1/_5$ in the male which is 22 mm. long). As regards the arrangement of the grooves and carinae on the sides of the carapace, this species resembles *Genn. borealis* (Rathbun, Decapod Crustaceans North West coast of North America, 1904, p. 147, Fig. 88); the gastro-frontal groove is, however, directed towards the rostral tooth and the post-cervical groove does not meet with the gastro-hepatic sulcus. Antennary and infra-antennary angles acute, branchiostegal spine small. The transverse cardiaco-branchial ridge is rather obtuse, does not reach the posterior margin of the carapace and fades away before reaching the post-cervical groove.

The 6th abdominal somite alone is carinate, the carina is obtuse and does neither reach the anterior nor the posterior extremity of the upper margin; this somite, 5,5 mm. long and just twice as long as wide, is almost twice as long as the 5th (3 mm.). The telson, 3,7 mm. long, little more than half the length of the 6th somite, reaches just to the middle of the endopod of the caudal fan, but not yet to the middle of the exopod; the telson tapers rather strongly, is slightly grooved and bears two movable spines at the extremity.

Eye-peduncles flattened above, with the large, acute, conical tubercle somewhat turned upward; the globular, dark red brown coloured cornea is a little broader than the peduncle and its diameter is just one-ninth the length of the carapace, rostrum included; there is a small speck of black pigment near the cornea. The small spine on the outer margin of the 1st antennular article does not yet attain the end of the cornea; the 3rd article, measured dorsally, appears one-third to one-half longer than the 2nd and both are together as long as the 1st; the thickened basal portion of the upper flagellum is almost as long as the 2nd and the 3rd articles taken together.

The antennal scale, 5,75 mm. long, measures nearly two-thirds the length of the carapace and reaches almost with the length of 3rd article beyond the antennular peduncle; the scale, somewhat more than 3-times as long as the greatest width (1,7 mm.) near the base, narrows rather strongly, the width of the obtuse tip measuring but $^1/_8$ or $^1/_9$ the greatest width. The inner margin of the scale is straight and the terminal spine extends beyond the tip of the blade as far as the latter is wide.

Mandibular palp about as in *Genn. Bouvieri*. Merus of 2nd maxilliped less than twice

as long as broad, the proportion being as 28 : 15; anterior prominence one-third the total length of the joint.

The external maxillipeds differ from those of *Amal. elegans* by the existence of a podobranch and by the characteristic form of their carpus; the epipod is narrow, one and a half as long as the basipodite is broad. Measured along the outer margin the ischium appears to be 3 mm. long; being 1 mm. broad in the middle, it proves to be just 3-times as long as broad. Merus 1,8 mm. long and 1 mm. broad. The carpus is claviform, (hence the name of the species), being considerably thickened distally; it is 1,56 mm. long, little shorter than the merus and the greatest thickness, 0,5 mm., is one-third its length; propodus as long as the carpus, but cylindrical, 5-times as long as thick; the dactylus, finally, is 0,85 mm. long, without the terminal spine, resembles that of *Amal. elegans*, and is little more than half as long as the propodus.

In the 1st pair of legs the carpus, which is a little shorter than the chela, measures three-fifths the length of the merus; fingers shorter than the palm. In the adult female the merus is almost 3-times, the carpus about 2,5-times and the chela 3,6-times as long as broad in the middle. In the adult female the chela of the 2nd legs is a little longer than the carpus, but in younger specimens their length is the same; fingers two-thirds the length of the palm. In the adult female the merus is almost 4-times, the carpus 3,4-times and the chela 3,2-times as long as broad in the middle. Merus of 3rd legs in the same specimen a little shorter than the carpus, also in the male long 22 mm., but in the female from Stat. 230 that has the same size the carpus is as long as the merus; the carpus gradually thickens towards the distal extremity; chela a little more than half as long as the carpus, palm slightly longer than the fingers. In the adult female the merus is 8-times, in the male, long 22 mm., 9-times as long as broad in the middle; in the adult female the carpus appears to be 15-times as long as thick in the middle and it is almost twice as thick at the distal extremity as in the middle; chela 3,8-times as long as broad.

Measurements in millimeters of the three first legs in three specimens:

	First legs			Second legs			Third legs		
	a	*b*	*c*	*a*	*b*	*c*	*a*	*b*	*c*
Length of merus	2,45	1,85	1,46	2,15	1,6	1,36	3,15	2,3	2
Width of merus	0,86	0,61	0,49	0,57	0,4	0,31	0,39	0,28	0,22
Length of carpus	1,5	1,12	0,94	1,62	1,2	1,04	3,4	2,3	2,2
Width of carpus	0,62	0,5	0,35	0,48	0,35	0,26	0,23	0,13	0,16
Length of chela	1,9	1,4	1,12	1,8	1,25	1,04	1,9	1,45	1,2
Length of palm	1,08	0,8	0,6	1,1	0,72	0,6	1,06	0,75	0,64
Width of chela	0,52	0,44	0,28	0,56	0,4	0,29	0,5	0,32	0,3
Proportion between length and width of chela	3,6	3,2	4	3,2	3,1	3,6	3,8	4,5	4

a adult female from Stat. 128; *b* the female long 23 mm. and *c* the male long 22 mm. from Stat. 230.

The legs of the 4th pair are slender and reach to the end of 2nd antennular article. In the adult female the merus, 3,35 mm. long and 0,36 mm. broad, appears 9-times as long as broad; the three last joints are respectively 2,35 mm., 2,1 mm. and 1,5 mm. long; the dactylus, 11-times as long as thick at its base, is straight and narrows regularly towards the extremity. Legs of 5th pair still longer and a little more slender.

The thelycum is characteristic and consists, in the adult female, of the following parts: 1° of a trapezoid, upstanding plate or tubercle between the legs of the 3rd pair; this plate, directed obliquely forward, is nearly as long as broad at base and the anterior border that is less broad than the base and emarginate, presents at either angle an acute tooth, while the converging lateral margins are sharp; this upstanding tubercle is followed, 2° by two much broader, horizontal plates, of which the anterior is shorter than the posterior and that project forward in the middle; these plates are situated between the legs of the 4th pair and finally, 3° by a narrow, horizontal plate between the legs of the 5th pair; this plate that joins the large, strongly compressed processes of the coxae of the 5th legs, is slightly longer than broad, concave above and the rounded, posterior margin is notched in the middle; the inner margins of the coxal processes are sharp and at a right angle with their much shorter, anterior margin.

There is a sharp tooth between the pleopods of the 1st pair and smaller prominences are observed between the following.

The mandibular palps and the meri of the 2rd and 3rd maxillipeds are of a fine violet colour; the carpal joints of the external maxillipeds and of the two first pairs of pereiopods are marked with a large violet spot at the far end of their upper surface and there is a smaller spot of the same colour at the base of the fingers of these legs, while the fingers are reddish or orange.

The five males from Stat. 230 certainly belong to this species. In two males of equal size the petasma is already developed, these males are 22 or 23 mm. long and their carapace, rostrum included, measures just one-third the length of the abdomen. The distal margin of each of the two laminae, of which the petasma consists, terminates, not far from the median line, in a broad rounded lobe and, on the outer side of this lobe, in two narrow teeth, the tooth next to the lobe being longer and sharper than the other at the outer angle and slightly curved forward and outward; between the two large lobes are four very small teeth, the outer of which are larger than the inner; the large rounded lobe and the two lateral teeth of each lamina are separated by small, tooth-like lobules. One observes, moreover, on the anterior surface of the petasma, two small, compressed, dentiform lobes not far from the distal margin and near the median line of the organ. In the third male, which is a little larger, the carapace, rostrum included, being 6,75 mm. long, the two laminae of the petasma are not yet in contact; instead of the large, rounded lobe on the distal border one observes here a triangular, pointed process, the acuminate tip of which is curved forward. In the fourth male, that has nearly the same size as the third, the carapace, rostrum included, being 6,5 mm. long, the two laminae are also free, but smaller. In the youngest male finally, (carapace with rostrum 5 mm. long), the

two plates are very small and in this specimen there is a sharp tooth between each of the three posterior pairs of legs, the tooth between the 4th pair being the largest.

Like the males, the females are also of a smaller size than the female from Stat. 128, described above. In the largest specimen, in which the carapace with the rostrum is 6,5 mm. long, the thelycum resembles that of the female from Stat. 128, but the upstanding plate is barely emarginate and the two lateral angles of the anterior margin are hardly dentiform. The four other females are still younger, the carapace with the rostrum of the largest specimen being 5,3 mm. long; in these individuals that apparently belong to the same species, because they show even quite the same violet spots on the maxillipeds and on the two first legs as the female from Stat. 128, one observes between the 3rd and 4th pairs of legs a large, oval plate, longer than broad and slightly convex above, instead of the upstanding and horizontal plates in the larger females. These four females show a somewhat darker colour than the six other specimens from this Station, they were preserved in another tube.

The female from Stat. 141 is very young, the carapace with the rostrum being 4,2 mm. long. The corneae of the eye-stalks are of a much paler colour than in the other specimens, but the speck of black pigment is much larger, situated on the middle of the outer border of the peduncle, while on the right stalk the speck is angular, reaching even to the middle of the upper surface.

Remarks. *Genn. Bouvieri* Kemp (in: Proc. Zool. Soc. London, 1909, p. 726, Pl. LXXIV, Fig. 1—4 and Pl. LXXV, Fig. 6 and 7) is apparently very closely related, if not identical with this species. The thelycum has, however, a different form and the upstanding plate or tubercle between the 3rd legs is not described. The 2nd joint of the antennular peduncle should be about as long as the 3rd. In the 2nd pair of legs the dactylus has the same length as the palm and the whole chela should be a little shorter than the carpus. The male of this species is unknown; the three females were captured at 2100 fathoms near Manila and at 1100 fathoms North of New Guinea, they were 26—28 mm. long.

Hemipenaeus Sp. Bate.

This genus, in the definition first given to it by Professor Alcock, is represented by 7 species, 3 of which are characterized by a large spine with which the carina of the 3rd abdominal tergum is armed. *Hemip. spinidorsalis* Sp. Bate is the most widely-ranging form, occurring both in the Indopacific and in the Atlantic; this species has, indeed, been taken by the „Challenger" near the island of Tristan da Cunha and near the Philippines, while it has also been recorded from several localities off the west coast of Central America. *Hemip. Carpenteri* W.-Mas. inhabits the Arabian Sea and the Bay of Bengal. *Hemip. Triton* Fax., finally, occurs also on the west coast of Central America, but this species is perhaps identical with *Hemip. Carpenteri.* Of the four species in which the 3rd abdominal somite is unarmed, only one, viz. *Hemip. speciosus* Sp. Bate, occurs in the Atlantic and was taken East of Buenos Ayres. *Hemip. crassipes* W.-Mas. has been obtained in the Arabian Sea, in the Gulf of Manár, in the Bay of Bengal and in the Andaman Sea; it has also been taken by the "Siboga" North of Sumbawa

and in the Strait of Makassar. Still another species was obtained by this Expedition, between Flores and Sumba, it is described as the new *Hemip. Sibogae.* The last species, finally, is *Hemip. gracilis* Sp. Bate, collected by the "Challenger" off Tablas Island, Philippines; this species, established on rather young specimens, is insufficiently known, but may perhaps be identical either with *Hemip. crassipes* or with the new *Hemip. Sibogae.*

The species of this genus are all found in deep water, at depths of 500 m. and more, but the vertical distribution is rather variable. So e. g. *Hemip. crassipes* has been taken at depths of 500 m., but also between 767 and 950 fathoms, *Hemip. Carpenteri* at depths of 902 but also of 1644 fathoms and *Hemip. speciosus* was obtained in water of 2650 fathoms, so that some of these species may be considered as truly abyssal.

† 4. *Hemipenaeus crassipes* (W.-Mas.).

J. Wood-Mason, in: Ann. Mag. Nat. Hist., Ser. 6, Vol. VIII, Oct. 1891, p. 281, 282, Fig. 7 (♀).
A. Alcock, Indian Deep-Sea Crustacea, Decapoda Macrura and Anomala, Calcutta, 1901, p. 33; Illustrations of the Zoology of the Investigator, Crustacea, Pl. XLIX, Fig. 1 and 2.

Stat. 45. April 6. 7° 24′ S., 118° 15′.2 E. Flores Sea. 794 m. Fine grey mud, with some radiolariae and diatomes. 1 young male.
Stat. 85. June 17. 0° 36′.5 S., 119° 29′.5 E. Strait of Makassar. 724 m. Fine, grey mud. 1 almost adult female.

The female perfectly well agrees with the cited descriptions and figures. The carapace, rostrum included, is 70 mm. long, the rostrum, 39 mm., being a little longer than the carapace. Different from Alcock's description, the tubercle of the eye-stalks is rather prominent. External maxillipeds reaching almost to the middle of the chelae of 1st pair, terminal joint slender, excavate at base. First pair of legs as long as the antennular peduncle, second pair almost reaching to the tip of the scales, while those of the 3rd pair extend with half the length of the fingers beyond that tip; the legs of the 4th pair reach with the dactyli beyond the tip of the scales, those of the 5th with the dactyli and half the propodi. The merus of 3rd legs is 16,5 mm. long and 3 mm. wide in the middle, the carpus is 19,5 mm. long.

In the male the carapace with the rostrum is 26,5 mm. long; the rostrum, 9,5 mm. long, measures a little more than half the length of the rest of the carapace, while in the adult male it measures about a third that length. The straight lower margin of the rostrum that just reaches beyond the middle of 2nd antennular article, appears slightly more ascending than in Fig. 2 of the "Illustrations". The rostral carina may be followed to within a short distance of the small tubercle that is situated just in front of the posterior margin of the carapace.

Tubercle on the eye-stalks prominent. The external maxillipeds extend with their dactyli beyond the tip of the antennal peduncles, reaching about to the middle of 2nd antennular article; the antepenultimate joint, a little shorter than the propodus and the dactylus taken together, appears a little more slender than in the figure of the "Illustrations" and the propodus is prolonged beyond the articulation of the dactylus, which is distinctly emarginate at its base. The legs of the 1st pair just reach beyond the tip of the antennular peduncle, while those of the 3rd are as long as the scaphocerite; the merus of 3rd legs is 9,5 mm. long, the carpus 10,5 mm. The two leaves of the petasma are not yet united with one another.

This species is represented in the South Atlantic, East of Buenos Ayres, by *Hemip. speciosus* Sp. Bate, which differs by the posterior half of the 3rd abdominal somite being elevated to a small carina and by a few other differences.

General distribution: Arabian Sea, in the neighbourhood of the Laccadives and Malabar coast, Gulf of Manár, Bay of Bengal, Andaman Sea (Wood-Mason and Alcock).

† 5. *Hemipenaeus Sibogae* n. sp.

Stat. 52. April 20. 9° 3'.4 S., 119° 56'.7 E. Savu Sea. 1000 m. Globigerina ooze. 1 adult female.

Closely related to *Hemip. crassipes* (W.-Mas.).

Carapace, abdomen and appendages covered with a dense, though fine tomentum. Rostrum hardly reaching to the tip of the antennal scales, distinctly shorter than the carapace, the length of the rostrum (28 mm.) being about $^5/_6$ that of the carapace (34 mm.). The three teeth of the rostrum are less prominent than in the female from Stat. 85, which was referred to *Hemip. crassipes*, and the distance between the 1st and the 2nd tooth, when compared with that between the 2nd and the 3rd, is a little shorter than in that female; the three teeth are situated in the same horizontal line, while in the female of *crassipes* a line uniting the tips of the teeth appears distinctly arcuate. The free part of the rostrum is slightly recurved and is much shorter and much less slender than in the female of *Hemip. crassipes*. The post-rostral crest is traceable as a blunt and low ridge, though rather inconspicuously, to midway between the cervical i. e. gastro-hepatic groove and the hinder margin of the carapace. The two spines and crests on the latter are as in *Hemip. crassipes*, but the still more strongly marked, cervical groove distinctly indents the dorsal ridge, while, as in *Hemip. crassipes*, the post-cervical groove does not indent it; the post-cervical groove is less strongly marked than the cervical, nearly as in the other species of the genus.

Fourth to 6th abdominal terga carinated, each carina ending in a spine. Measured along their upper margin the proportion between the length (9 mm.) of the 5th abdominal somite and that of the 6th (16,5 mm.), appears nearly the same as in *Hemip. crassipes* and the proportion between the length (16,5 mm.) and the width (10,5 mm.) of the 6th somite is also about the same, though in the female of *Hemip. crassipes* the somite appears a trifle less wide (viz. 10 mm.) in regard to the length (17,5 mm.). Telson armed at either side with 4 spinules, caudal fan as in *Hemip. crassipes*.

Eyes black, wider than their stalk and a little smaller in proportion to the length of the stalk than in *Hemip. crassipes*, the tubercle a little less prominent. Antennules as in this species, the antennal scales a little wider. External maxillipeds extending to the extremity of the penultimate article of the antennular peduncle.

Legs of 1st pair a little longer than the external maxillipeds, as long as the antennular peduncle, 3rd legs just reaching beyond the rostrum and the antennal scales. As in *Hemip. crassipes*, the meri are broad and compressed, the chelae and the fingers very long, but the carpi and the chelae are comparatively shorter and less slender. So e. g. are the meri of 3rd legs 17 mm. long and 3 mm. broad; the carpi are 17,5 mm. long and 2 mm. thick

at their distal extremity, the chelae, finally, are 20,5 mm. long. In the female of *Hemip. crassipes*, on the contrary, the merus is 16,5 mm. long and 3 mm. wide, the carpus 19,5 mm. long and 2 mm. thick at the distal extremity, while the chelae are 22 mm. long.

The 4th legs project with their dactyli beyond the antennal scales and with one-third of these joints beyond the legs of the 3rd pair; those of the 5th have lost propodus and dactylus; but the carpi reach almost to the extremity of 2nd antennular article. The 4th and the 5th legs are somewhat less slender than those of *Hemip. crassipes*, as in shown by the following Table, while the carpi and propodi are also a little shorter with regard to the meri.

		Hemip. Sibogae. ♀	*Hemip. crassipes.* ♀
Length of the merus	of fourth legs	19,5 mm.	19 mm.
Width [1]) of the merus		1,06 mm.	0,9 mm.
Proportion between length and width of the merus		18	21
Length of the carpus		17,75 mm.	19 mm.
Width of the carpus		0,66 mm.	0,5 mm.
Proportion between length and width of the carpus		27	38
Length of the propodus		13,5 mm.	14,6 mm.
Width of the propodus		0,5 mm.	0,42 mm.
Proportion between length and width of the propodus		27	35
Length of the dactylus		7,5 mm.	7,5 mm.
Length of the merus	of fifth legs	21 mm.	22 mm.
Width of the merus		1 mm.	0,82 mm.
Proportion between length and width of the merus		21	27
Length of the carpus		20,5 mm.	23,5 mm.
Width of the carpus		0,6 mm.	0,5 mm.
Proportion between length and width of the carpus		34	47
Length of the propodus			21,5 mm.
Width of the propodus			0,34 mm.
Proportion between length and width of the propodus			65

In the female of *Hemip. crassipes* the legs are smooth and glabrous, in *Hemip. Sibogae*, on the contrary, thickly covered with microscopical spinules.

Thelycum as in *Hemip. crassipes*, and, as regards the branchial formula, both species also seem to agree. Length of body from the tip of the rostrum to that of the telson 136 mm.

Remarks. *Hemip. gracilis* Sp. Bate from the Philippines may be identical with this species or with *Hemip. crassipes*. Dr. Calman, of the British Museum, who kindly examined for me the six type specimens, wrote me the following:

"I find that there are six specimens of *Hemip. gracilis* from the same locality in the "Challenger" Collection. The most perfect of these has a total length of about 48 mm. (the tip of the telson is broken); it has the third abdominal somite rounded, not carinate. The length of the sixth abdominal somite along the upper edge is 7,2 mm., its width, in the middle of the somite, is 3,9 mm. and it is 1,5 mm. thick. The length of the fifth somite is 3,25 mm.

1) Measured in the middle of the joint.

The carina of the carapace extends almost to the hinder edge.

The rostrum is about as long as the first segment of the antennule. In all the other specimens it is broken, but it appears not to have been much longer in any of them. The surface of the body is very slightly tomentose".

It is apparent from these measurements that in SPENCE BATE's figure in the Report on the Challenger Macrura the 6th abdominal somite has been figured too narrow. Nothing is known about the rostrum of the female and unfortunately I did not inquire after the measurements of the legs, in the figure, however, the meri of the three chelipeds appear more slender than in *Hemip. Sibogae.*

Aristeus Duv.

Of the 5 species included in this genus, two are inhabitants of the eastern Pacific, the East Indian Archipelago and parts of the Indian Ocean, viz. 1° *A. virilis* Sp. Bate that is known from the Philippine Islands, the New Hebrides and from the Andaman Sea, while it was taken by the "Siboga" at seven Stations in the Indian Archipelago, 2° *A. semidentatus* Sp. Bate, a species observed near the Kermadec Islands, off Banda, in the Bay of Bengal and in the Arabian Sea, while two specimens were taken by the "Siboga" at the Kei Islands. A third species, 3° *A. occidentalis* Fax., is found in the western Pacific, off the coast of Central America. The fourth, 4° *A. antillensis* Bouv., occurs in the Sea of the Antilles, 5° *A. antennatus* Risso, finally, the species on which this genus was established by DUVERNOY, inhabits the Mediterranean and the temperate and subtropical parts of the eastern Atlantic. As regards their vertical distribution all the species of this genus are subabyssal, the greatest depth at which this genus has been observed, being 1440 m., viz. *A. antennatus*, but this species has also been captured off Algiers in water of moderate depth (BOUVIER).

†6. *Aristeus virilis* (Sp. Bate).

Hemipenaeus virilis C. Spence Bate, Challenger Macrura, 1888, p. 303, Pl. XLIV, Fig. 4.
Hemipenaeus tomentosus C. Spence Bate, Challenger Macrura, 1888, p. 307, Pl. XLIX, Fig. 2, 3; Pl. L.
Aristaeus virilis J. Wood-Mason, Ann. Mag. Nat. Hist. Ser. 6, Vol. VIII, Oct. 1891, p. 279.
Aristaeus virilis A. Alcock, Indian Deep-Sea Crustacea, Decapoda Macrura and Anomala, Calcutta. 1901, p. 30.

Stat. 38. April 1. 7° 35'.4 S., 117° 28'.6 E. Flores Sea. 521 m. Coral. 7 males and 3 females.
Stat. 74. June 8. 5° 3'.5 S., 119° 0' E. Strait of Makassar. 450 m. Globigerina ooze (obviously a thin layer). 4 males and 3 females.
Stat. 161. August 17. 1° 10'.5 S., 130° 9' E. Halmahera Sea. 798 m. Muddy sand. 1 male, 2 females.
Stat. 173. August 28. 3° 27'.0 S., 131° 0'.5 E. Ceram Sea. 567 m. Fine, yellow grey mud. 1 female.
Stat. 212. September 26. 5° 54'.5 S., 120° 19'.2 E. Off Saleyer. 462 m. Fine grey and green mud. 1 female.
Stat. 262. December 18. 5° 53'.8 S., 132° 48'.8 E. Near Kei-Islands. 560 m. Solid bluish grey mud, upper layer more liquid and brown mud. 1 male and 1 female.
Stat. 316. February 19. 7° 19'.4 S., 116° 49'.5 E. Bali Sea. 538 m. Fine, dark brown, sandy mud. 7 males and 13 females.

According to Col. ALCOCK's description, whose specimens were taken in the Andaman Sea, the pleurobranchiae in advance of somite XIV should be distinct filaments, some of which are provided with three or four tiny pinnules. In the specimens collected by the "Siboga", these pinnules are more numerous and they are for the majority *bifurcate*; their number, however, is somewhat variable.

The 10 specimens from Stat. 38 are all young and nearly of the same size, the carapace, rostrum excluded, being 26—28 mm. long. As was already pointed out by WOOD-MASON, the rostrum of these young males ends in a long styliform process, that is somewhat curved upward and that reaches far beyond the antennular peduncles. So in two males, in which the carapace is 27 mm. long without the rostrum and 48 mm. when it is included, the styliform rostrum reaches to the distal spine at the outer margin of the antennal scales, in another male of the same size it extends to the end of the scaphocerites and in a fourth even beyond them. In the young females the rostrum is as long or slightly longer than the carapace, extending far beyond the antennal scales. At this age the inner antennular flagellum does not yet show, in the male, the curious bend and twist at the base, that is observed in the adult. At this age also, in the male, the antero-external angle of the propodus of the external maxillipeds is not yet prolonged beyond the articulation of the dactylus and the branches of the petasma are not yet united with one another. In a male, long 115 mm., with styliform rostrum, the pleurobranchia of somite XIII is 1,7 mm. long and bears at each side 14 or 15 for a part already bifurcate pinnules.

The specimens from Stat. 74 are almost adult and agree with ALCOCK's description, except that in the females the external maxillipeds are not shorter but even slightly longer than the 1st pair of legs, so e. g. in a female long 160 mm. The antennal flagellum of this female is 260 mm. long, more than one and a half as long as the body. In a male, long 140 mm., the pleurobranchia of Somite XIII is 1,8 mm. long with 14 or 15 pairs of pinnules, of which the 8 or 9 proximal ones are bifurcate; in a female of the same size this gill has the same length, but there are only 10 or 11 pairs of pinnules, that are a little longer than in the male; in another female, long 170 mm., the pleurobranchia of Somite XIII is 2 mm. long and bears 11 or 12 partly bifurcate pinnules that are again as long as in the male.

The male from Stat. 161 is adult, the carapace with the rostrum being 51 mm. long; the rostrum that measures $^4/_9$ the length of the rest of the carapace, reaches to the end of the 2nd antennular article; it is not horizontal as usual, but obliquely directed upward. The two females are also adult, nearly of equal size, 190 mm. long. In one of them the rostrum is little more than half as long as the rest of the carapace, it reaches to midway between the tip of the antennular peduncle and that of the antennal scales and is slightly turned downward; in the other female the rostrum reaches just beyond the extremity of the antennular peduncle and its styliform, distal half is slightly curved upward; in the first female the external maxillipeds are a little shorter than the 1st pair of legs, in the other they are just as long. In these females the pleurobranchia of Somite XIII is 2,4 mm. long and bears 11 or 12 pairs of pinnules, most of which are bifurcate.

The female from Stat. 173 is 140 mm. long; the pleurobranchia of Somite XIII is a filament long 2,3 mm. with 15 pairs of pinnules, that are for the greater part bifurcate.

Some observations about the male and the female from Stat. 262 will be found in the description of *A. semidentatus*, on the next page; both are of medium size. The carapace, rostrum included, of the male is 42,5 mm. long; the rostrum, that is nearly horizontal, reaches almost to the end of the antennular peduncle; the 2nd tooth is but little farther distant from the 1st than from the 3rd, that is situated just in the middle between the 2nd tooth and the tip. The bend at the base of the inner flagellum is already quite distinct and the petasma is already developed. The external maxillipeds are just as long as the legs of the 1st pair. The rostrum of the female is just as long as the carapace and the external maxillipeds are exactly as long as the 1st pair of legs. In both specimens the pleurobranchia of Somite XIII is 3,5 mm. long with 20—25 pairs of pinnules, almost all bifurcate.

In these specimens from the Kei Islands the pleurobranchiae are slightly larger and their pinnules are more numerous than in the other specimens that have been collected.

The 20 specimens, finally, taken in the Bali Sea, are of all ages. In an adult female the carapace, rostrum included, is 80 mm. long, the rostrum, half as long as the rest of the carapace, reaches to the middle of the outer antennular flagellum. In a female, long 170 mm., the pleurobranchia of Somite XIII is 1,7 mm. long with 11 or 12 pairs of partly bifurcate pinnules and in a male long 135 mm. this gill is 1,8 mm. long with 14 or 15 pairs of mostly bifurcate pinnules. The 11 young males and females agree with those from Stat. 38.

General distribution: Near the Philippine Islands (Spence Bate); New Hebrides (Spence Bate); Andaman Sea (Alcock).

† 7. *Aristeus semidentatus* (Sp. Bate).

Hemipenaeus semidentatus C. Spence Bate, Report Challenger Macrura, 1888, p. 305, Pl. XLIX, Fig. 1 (♀).
Aristeus semidentatus J. Wood-Mason, in: Ann. Mag. Nat. Hist., Ser. 6, Vol. VIII, Oct. 1891, p. 280.
Aristeus semidentatus A. Alcock, Catal. Indian Deep-Sea Crustacea, Calcutta, 1901, p. 31; Illustrations of the Zoology of the Investigator, Crustacea, Pl. XLIX, Fig. 3 (♂).

Stat. 262. December 18. 5° 53'.8 S., 132° 48'.8 E. Near Kei Islands. 560 m. Solid bluish grey mud, upper layer more liquid and brown mud. 1 male and 1 female.

It is with some doubt that these specimens are referred to *A. semidentatus*, because according to Alcock the pleurobranchiae in advance of Somite XIV should be mere little papillae, only visible with a lens, while both in the male and in the female these branchiae proved to be distinct filaments similar to those of *A. virilis* (Sp. Bate). For the rest, however, they fully agree with the characters mentioned by Alcock. The male closely resembles the quoted Figure 3 in the "Illustrations". The rostrum, the upper margin of which is slightly turned downward, reaches almost to the end of 2nd antennular article, the situation of the three teeth is exactly the same as in Fig. 3. The rostral carina extends to the middle of the carapace. Third abdominal somite rounded, its posterior margin unarmed. Eyes black, tubercle of the eye-stalk conical, prominent.

In the male of *A. virilis* the basal part of the inner antennular flagellum is distinctly concave at the inner side and it appears distally, near the extremity of the outer flagellum,

distinctly widened, wider than in the middle. In the male of *A. semidentatus* the inner flagellum regularly tapers, being not broadened and the basal part, that is only slightly bent and twisted, is not concave at the inner side. The scaphocerite, that is not so strongly thickened at the tip as in the male of *A. virilis*, appears also, with regard to the length of the carapace, shorter than in that species. In a male of *A. virilis* which was also captured at Stat. 262, the carapace, rostrum excluded, is 28 mm. long and the scaphocerite, long 21 mm., measures just three-fourths that length; in the male of *A. semidentatus* these numbers are respectively 27 mm. and 17,5 mm., the scaphocerite measuring hardly two-thirds the length of the carapace. In the male of *A. virilis* the external maxillipeds are just as long as the 1st pair of legs, but in the male of *A. semidentatus* they extend with the length of the dactylus beyond the extremity of these legs and the penultimate and antepenultimate joints appear in *A. virilis* a little more slender. In the male of *A. semidentatus* the 1st pair of legs reach to the end of 2nd antennular article and the 3rd to the tip of the antennal scales; the two posterior legs are almost equally long, reaching with their dactyli and one-fourth of the propodi beyond the tip of the scaphocerites. As regards the relative measurements of the merus and the carpus of 3rd legs, the two species apparently do not differ from one another. In the male of *A. virilis* the merus and the carpus of 3rd legs are respectively 11,5 mm. and 14 mm. long, in the female 12,5 mm. and 16 mm.; in the male of *A. semidentatus* these numbers are respectively also 11,5 mm. and 14 mm., in the female 13,5 mm. and 16 mm. There are, however, other differences. In the male (not in the female) of *A. semidentatus* the lower margin of the merus of the 1st pair of legs appears in the middle slightly concave, but in the male of *A. virilis* quite straight, and the chelae of the three legs are, in *A. semidentatus*, distinctly shorter with regard to the carpus than in *A. virilis*. In the male of *A. virilis* from Stat. 262 the carpus of 3rd legs is 14 mm. long, the chela 12,5 mm. and in the female of the same species these numbers are respectively 16 mm. and 14 mm.; in the male of *A. semidentatus*, however, these numbers are respectively 14 mm. and 10,5 mm., in the female 16 mm. and 12,5 mm.

In the female, somewhat larger than the male, the carapace, 33,5 mm. long, is slightly shorter than the rostrum that is 36 mm. long; the rostrum that reaches with half its length beyond the antennular peduncle, extends by one-third of its length beyond the tip of the scaphocerites, and, while the basal portion is slightly directed downward, the slender and styliform, apical part is distinctly ascending.

The external maxillipeds that reach to the end of 2nd antennular article, project with half their dactyli beyond the 1st pair of legs, while the 3rd legs extend to the distal third of the scaphocerites. The two posterior pairs of legs are subequal and almost reach to the tip of the scaphocerites.

The pleurobranchia of somite XIII of the female is 2,5 mm. long and bears 19 or 20 mostly bi- or trifurcate pinnulae.

In both specimens body and thoracic appendages are glabrous and polished, the fingers are of a pale reddish colour.

Remarks. This species is very closely related to *A. occidentalis* Fax. from the Galapagos Islands, but in this form the pleurobranchiae of the somites X—XIII should bear

no pinnulae at all. (W. Faxon, in: Memoirs Museum Comp. Zool. at Harvard College, XVIII, 1895, p. 195).

General distribution: Near the Kermadec Islands (Spence Bate); off Banda (Spence Bate); Arabian Sea near the Laccadives and Cape Comorin and Bay of Bengal (Alcock).

Subfamily Penaeinae Alcock.

Haliporus Sp. Bate.

The genus *Haliporus* Sp. Bate at present comprises not less than 23 species, inclusive the two new ones that were captured by the "Siboga". The species of this genus are found in various parts of the Atlantic, the Pacific and the Indian Oceans, but have not yet been observed in the North Pacific, the Seas of Japan, along the east coast of Africa or in the Red Sea. Two which are closely related, viz. *Halip. microps* (S. I. Smith) and *Halip. laevis* Sp. Bate, occur both in the Atlantic and in the Indopacific. *Halip. microps*, indeed, occurs in the western part of the North Atlantic, but has also been observed in the Arabian Sea and in the Bay of Bengal; the other, *Halip. laevis*, was taken by the "Challenger" Southwest of Sierra Leone and off Manila, Philippines.

Of the other species, *Halip. affinis* occurs as well in the Sea of the Antilles as at the Cape Verde Islands, and *Halip. debilis* (S. I. Smith) is found along the east coast of the United States as far as the Antilles but also at the Azores and in the eastern Atlantic. *Halip. modestus* is confined to the east coast of the United States, *Halip. robustus* (S. I. Smith) and *Halip. tropicalis* Bouv. are inhabitants of the Caribbean Sea, the latter also of the Florida Bank and *Halip. Mülleri* (Sp. Bate) has hitherto only been recorded from the sea off Montevideo. *Halip. androgynus* Bouv. is known from the Sea between the Senegal and the Cape Verde Islands. Four species occur along the west coast of Central America, viz. *Halip. diomedeae* Fax., *Doris* Fax., *Nereus* Fax. and *Thetis* Fax., *Halip. curvirostris* Sp. Bate was observed by the "Challenger" near the Low Archipelago and in the South Pacific and *Halip. obliquirostris* Sp. Bate from off the Kermadec Islands, was taken by the "Siboga" at the Kei Islands.

Two new species were discovered by the "Siboga", each in several localities far remote from one another. *Halip. aequalis* Sp. Bate and *Halip. neptunus* Sp. Bate are not only known from the Philippines and from other localities of the East Indian Archipelago, but also from the Seas of India: *Halip. aequalis*, indeed, occurs also in the Andaman Sea, off Ceylon and in the Arabian Sea, *Halip. neptunus* in the Bay of Bengal. Of four other species *Halip. taprobanensis* A. And. occurs in the Gulf of Manár and off Cape Comorin, while *Halip. villosus* Alc. & And. is still only known from the Arabian Sea, *Halip. Lucasii* (Sp. Bate) occurs in the East Indian Archipelago, while *Halip. malhaensis* Borr., finally, was dredged off Saya de Malha, in the Western Indian Ocean.

Halip. Mülleri is found in rather shallow water, between 7 and 44 fathoms and the new *Halip. propinquus* was captured at Stat. 89 at a depth of only 11 m., but in two other Stations also at depths of 538 m. and 835 m. Some other species are living in deeper water,

subabyssal, but several are truly abyssal: so e. g. *Halip. androgynus* captured at a depth of 2000 fathoms and *Halip. curvirostris* observed in water of 2375—2385 fathoms.

Six or, when *Halip. laevis*, known from the Philippines, is included, 7 species appear to be inhabitants of the East Indian Archipelago.

†8. *Haliporus aequalis* Sp. Bate.

C. Spence Bate, Report Challenger Macrura, 1888, p. 285, Pl. XLI, Fig. 1.
J. Wood-Mason, Ann. Mag. Nat. Hist., Ser. 6, Vol. VIII, Oct. 1891, p. 277.
A. Alcock, Catal. Indian Deep-Sea Crustacea, Calcutta, 1901, p. 23.

Stat. 262. December 18. 5° 53′.8 S., 132° 48′.8 E. Near Kei Islands. 560 m. Solid bluish grey mud, upper layer more liquid and brown mud. 2 females.
Stat. 316. February 19. 7° 19′.4 S., 116° 49′.5 E. Bali Sea. 538 m. Fine, dark brown sandy mud. 2 females.

The specimens are nearly of the same size, not yet full-grown. The larger female from Stat. 262 is 78 mm. long. In this female, like in the three others, the rostrum is obliquely directed upward, not horizontal as should be the case in the female according to the author of the Report on the Challenger Macrura; this oblique direction was already observed by Wood-Mason. In the female, long 78 mm., the rostrum reaches to the far end of 2nd antennular article, it is a little shorter than half the length of the rest of the carapace measured near the dorsal median line, it is very slightly convex above, straight below and armed with 7 teeth in addition to the two epigastric teeth. In the other, somewhat younger female from the same Station, the rostrum, that reaches to the middle of the terminal joint of the antennular peduncle, appears just half as long as the rest of the carapace, it is straight above, but very slightly curved below; the toothing is 6 + 2, the foremost 7th tooth being rudimentary. In the females from Stat. 316 the toothing is also 7 + 2. The post-rostral ridge is quite inconspicuous behind the gastric region in all the specimens.

The 4th—6th abdominal terga are sharply carinated. In the two females from Stat. 262 the telson is much shorter than the inner caudal swimmeret, but in a female, long about 70 mm., from Stat. 316 the endopod hardly extends beyond the tip of the telson. The distance between the tip of the antennular peduncle and that of the antennal scale is, in the female long 78 mm., one and a half as long as the 3rd joint of the peduncle; the lower (inner) antennular flagellum, measuring 26,5 mm., is a little more than twice as long as the length of the peduncle i. e. the distance (11 mm.) between its extremity and the frontal margin of the carapace; the upper (outer) flagellum, unfortunately not complete, seems to be almost 3-times as long as the other and nearly as long as the body.

The flagella of the lower antennae are, in the female long 78 mm., 310 mm. long, 4-times as long as the whole body.

The external maxillipeds measure one-third the length of the body. There is a spine at the distal end of the ischium of the 1st pair of legs.

In the female, long 78 mm., the legs of the 4th pair measure two-thirds the length of the body, in another, long 68 mm., little more than half its length. In this female,

from Stat. 316, the legs of the 5th pair measure three-fourths the length of the whole body, whereas, according to ALCOCK, in full-grown specimens long 85 mm. these legs are at least as long as the body. Both in the legs of the 4th and in those of the 5th pair merus and carpus are equally long.

Immediately behind the tubercles on the coxae of the 3rd pair of legs, the females captured by the "Siboga" bear a transverse vertical plate with a rather sharp upper edge, but which barely can be said to have a crescentic or lunate form; the flattened, median, sternal, shield-shaped tubercle between the legs of the 5th pair appears in SPENCE BATE's Fig. 1''' just as long as broad, in all our females, however, distinctly broader than long.

Measurements in millimeters.

	1.	2.
Length from tip of rostrum to tip of telson:	78	68
Length of the carapace, rostrum included:	26,5	24
Length of the carapace, rostrum excluded:	18,5	16,3
Length of the antennal scale:	12	10,75
Greatest width of the antennal scale:	3,5	3
Length of external maxilliped:	25	22,5
Length of the 4th leg:	50	40
Length of merus of the 4th leg:	18	14
Length of carpus of the 4th leg:	18	14
Length of propodus of the 4th leg:	4,3	3,8
Length of dactylus of the 4th leg:	2,5	2,2
Length of the 5th leg:		51
Length of merus of the 5th leg:		16,5
Length of carpus of the 5th leg:		16,5
Length of propodus of the 5th leg:		9,5
Length of dactylus of the 5th leg:		2,5

N° 1 Station 262, N° 2 Station 316.

General distribution: Between the Philippine Islands and Borneo (SPENCE BATE); Andaman Sea, Arabian Sea and off Ceylon (ALCOCK).

†9. *Haliporus propinquus* de Man.

J. G. DE MAN, in: Notes from the Leyden Museum, Vol. XXIX, 1907, p. 140.

Stat. 89. June 21. Pulu Kaniungan Ketjil. Reef. 1 young male.
Stat. 178. September 2. 2°40' S., 128°37'.5 E. Ceram Sea. 835 m. Blue mud. 1 female.
Stat. 316. February 19. 7°19'.4 S., 116°49'.5 E. Bali Sea. 538 m. Fine, dark brown sandy mud. 11 males and 10 females.

A new species of Professor BOUVIER's first Section of the genus, which is characterized by the legs of the 4th and 5th pair being very long and filiform, reaching far beyond those of the 3rd pair.

Length of the male 81 mm., of the female 91 mm. This species in its outer appearance closely resembles *Halip. aequalis*. Integument thin, smooth, glabrous, and shining. Carapace, rostrum included, about one-third the total length. Rostrum obliquely ascending both in the male and in the female, straight, half as long or almost half as long as the rest of the carapace, reaching to the far end of 2nd antennular article; in addition to the two epigastric teeth, the anterior of which appears, as in *Halip. aequalis*, a little larger than the posterior, the upper margin of the rostrum bears in the largest male 6, in the other younger males 5 or 4 teeth, in the females are also 4 or 5, in one single specimen of medium size 6 teeth; the 1st tooth is situated on the carapace immediately behind the frontal margin or just above it and the distances between the rostral teeth become smaller towards the tip which is acute. The straight lower margin is fringed with long hairs. Rostral crest not interrupted by the cervical groove, produced as a distinct carina, which is, however, not at all prominent, to near a small tubercle, existing, as in *Halip. aequalis*, just near the posterior margin of the carapace. As regards the grooves and the position of the four spines on the sides the two species agree with one another.

In its general form the abdomen fully resembles that of *Halip. aequalis*, but the terga are carinate in a different manner. In the adult male from Stat. 316, long 81 mm., the 1st abdominal tergum shows a trace of a short carina in the middle, the 2nd and 3rd terga are distinctly carinate from the transverse furrow near the anterior margin to the posterior, though their carinae are not so sharp as those of the 4th—6th somites; in the largest female from the same Station the carinae on the 1st and 2nd terga are rather inconspicuous, but the carina of the 3rd is well developed and also in younger individuals the carinae of the two first terga are sometimes indistinct. It is only the crest of the 6th somite that ends in a small tooth. Sixth abdominal somite one and a half as long as the 5th and a little more than one and a half as long as high; in the female long 91 mm. from Stat. 316 the 6th somite is 10,6 mm. long and 6,5 mm. high, whereas the 5th is 7,3 mm. long; in the largest male these numbers are, in the same succession, 9,3 mm., 5,4 mm. and 6,3 mm. The telson which resembles that of *Halip. aequalis*, reaches about as far backward as the inner uropod, usually a little shorter, sometimes extending just beyond it; the outer uropod reaches with one-fifth of its length beyond the apex of the inner. The telson is a little longer than the 6th somite and acuminate; its upper surface is carinate in the median line from the pointed tip nearly to the middle.

Eyes as in *Halip. aequalis*, hemispherical, black, their major diameter just twice as long as the width of the peduncle; a small, conical tubercle on the inner side of the peduncle.

The two pairs of antennae seemingly not differ from those of *Halip. aequalis*. In adult specimens the tapering, lower, antennular flagellum is not yet one and a half as long, but in younger specimens a trifle more than one and a half as long as the carapace without the rostrum: so e. g. in the largest male the lower flagellum is 24 mm. long, the carapace without the rostrum 17,5 mm., in younger males these numbers are respectively: 22, 13,75 or 21, 13; in the largest female, long 91 mm., they are 30 and 22; in younger females 28 and 20, 27 and 16,5, 23 and 13,25, 21 and 11,75. These numbers seem to show that this flagellum is somewhat longer in the female than in the male, at least in the younger specimens. Upper flagellum about 3-times as long as the lower, nearly as long as the whole body.

Antennal peduncle reaching in the male to the proximal third, in the female to the middle of the 2nd joint of antennular peduncle; flagellum incomplete in all the specimens, but certainly more than twice as long as the body.

The mandibular palpi show a somewhat different form, the 1st or proximal joint appearing less broad in proportion to its length than in *Halip. aequalis*. External maxillipeds extending with almost the whole dactylus beyond the tip of the antennal scales.

The first pair of pereiopods reach to the end of 1st antennular article; there is a spine at the far end of the ischium, but apparently no one at the base, following legs unarmed. The legs of the 2nd pair reach to the end of the antennular peduncle; the carpus, one-fourth longer than the merus, and, like that of the 3rd pair, not at all dilated proximally, appears here as thick as at the distal extremity. The legs of the 3rd pair extend about with the chela beyond the apex of the antennal scale; carpus one and a half as long as the merus.

The filiform legs of the 4th pair that project nearly with the whole carpus beyond the antennal scales, measure three-fourths the length of the body, being 58 mm. long in the adult male measuring 81 mm. and 73,5 mm. long in the adult female measuring 91 mm. The carpus, in the adult female one-fourth longer than the merus, in the male a little less, appears in the latter $4^1/_2$-times, in the female almost 6-times as long as the propodus, that is twice as long as the dactylus. The fifth pair of pereiopods are much longer than the 4th; unfortunately the 5th legs are not complete in the few adult specimens that were collected, but they are certainly almost as long as the whole body. In adult specimens, both males and females, the meri reach, like those of the 4th pair, to the tip of the rostrum; the carpus is a little longer than the merus, the propodus a little more than half as long as the carpus, but the short dactyli measure one-fifth or one-sixth of the propodus. In the adult male long 81 mm., the merus measures 23 mm., the carpus 25 mm., in the adult female, long 91 mm., the merus measures 27,5 mm., the carpus 31 mm., the two last joints are missing in both specimens; in a younger male, long 60 mm., the 5th legs measure 57 mm., the merus 18,25 mm., the carpus 20 mm., the propodus 11,75 mm., the dactylus 2 mm.; in a female, long 69 mm., the 5th legs proved to be 73 mm. long, the merus 22 mm., the carpus 26,5 mm., the propodus 15,5 mm., the dactylus 2,75 mm.; in another young female, long 58 mm., the 5th pair of legs are 61 mm. long, the merus 19,5 mm., the carpus 21,5 mm., the propodus 12,75 mm. and the dactylus 2,25 mm.

The petasma, certainly different from that of *Halip. neptunus* Sp. Bate, apparently also differs from the petasma of *Halip. aequalis*. According to Alcock (Catal. Indian Deep-Sea Crustacea, Decapoda Macrura and Anomala, Calcutta, 1901, p. 24), the two lobes of the petasma of *Halip. aequalis* terminate each "in two rounded lobules of slightly unequal size the inner of which is nicked at tip and as the outer lobule is notched at base there is an appearance of a third lobule further back". In *Halip. propinquus* each lobe of the petasma ends in two lobules; the anterior lobule is much larger than the posterior, its obtuse tip shows a small incision and is, like the sinuous posterior margin of the lobule, beset with small spiniform setae; the posterior lobule is triangular, with a subacute tip and the posterior border bears similar small spinules along its upper half, but they are much smaller than those of the larger lobule. There is a strong, acute, compressed tooth on the sternum of the 1st abdominal somite, a smaller tooth on that of the 2nd.

As well in the females referred to *Halip. aequalis* as in those of the present species there is a transverse vertical plate on the sternum between the legs of the 4th pair; but, while the upper margin of this plate is sharp and cutting in *Halip. aequalis*, the plate is much thicker, less compressed and its upper border obtusely rounded in this new species, the upper border is moreover a little hairy. One observes, behind this plate, in the specimens of *Halip. aequalis*, two compressed processes with rather sharp upper edge, but in *Halip. propinquus* they have a different form, presenting a slightly concave, upper surface. Instead of the low and flattened, shield-like plate that exists between the 5th legs of *Halip. aequalis*, one observes, in *Halip. propinquus*, a much thicker and higher transverse tubercle, the postero-lateral angles of which are somewhat conical with obtuse tip; the convex, anterior side of this tubercle is a little pubescent. The tubercles that bear the openings of the oviducts are as large as and equal to those of *Halip. aequalis*.

Exopod of 2nd maxillipeds slender, as long as the merus, those of the 3rd pair like also those of all the pereiopods quite rudimentary.

10. *Haliporus obliquirostris* Sp. Bate.

C. Spence Bate, Report Challenger Macrura, 1888, p. 286, Pl. XLI, Fig. 2.

Stat. 262. December 18. 5° 53′.8 S., 132° 48′.8 E. Near Great Kei Island. 560 m. Solid bluish grey mud, upper layer more liquid and brown mud. 1 female.

A full-grown specimen, 120 mm. long, was collected, while the specimens of the "Challenger" measured only 76 mm., little more than half that length. The rostrum, 13 mm. long, barely half as long as the rest of the carapace, measured near the dorsal median line (30 mm.), is obliquely directed upward, little more than in the "Siboga" specimens of *Halip. aequalis*; the rostrum that not yet attains the far end of the 2nd joint of the antennular peduncle, is straight above, whereas its lower margin is very slightly convex. It is armed above with 6 teeth of which the five foremost are nearly equidistant, but the 1st tooth, situated immediately behind the frontal margin of the carapace, is twice as far distant from the 2nd as the 2nd from the 3rd; in addition to these teeth, the gastric region carries two other teeth, of which the anterior is larger than the posterior and than the teeth of the rostrum proper. There is a distinct, though rather low, post-rostral ridge that fades away about 2 mm. in front of a small conical tubercle, that exists also in *Halip. aequalis* and that is 1,5 mm. distant from the posterior margin of the carapace.

The outer angle of the orbits is rounded. Of the four spines on either side of the carapace, the antennal is small, much smaller than the three other spines; the branchiostegal spine, that is somewhat remote from the anterior border, is slightly larger than the two other spines.

The 3rd abdominal tergum is not carinate, but it is obtusely compressed posteriorly; the 4th and the 5th somites are carinate except a small part of the 4th quite anteriorly and the carina of the 6th terminates in a small tooth. The telson, about one-third longer than the 6th somite, just reaches beyond the apex of the inner uropod; it is broadly grooved from its base to

the level of the lateral spines and it terminates in a long styliform point. The inner uropod is 2 mm. shorter than the outer.

The eye-peduncle carries a small tooth on its inner border, the major diameter of the eye is more than twice as broad as the eye-stalk.

The antennular peduncle is little shorter than the antennal scales, the distance between its apex and that of the scales measuring hardly two-thirds the length of the terminal joint; the outer margin of the 2nd joint, that is almost twice as long as the 3rd, is carinate. The lower shorter flagellum is 40 mm. long, nearly as long as the carapace, rostrum included; the other flagellum is incomplete.

The antennal scale is 17 mm. long, its greatest width, $5^2/_3$ mm., is just one-third its length; the outer margin is slightly curved inward distally and terminates in a small tooth that just reaches beyond the apex of the scale. The flagellum is more than twice as long as the body.

The external maxillipeds extend with half their penultimate joint beyond the apex of the antennal scales. The base and the ischium of the 1st pair of pereiopods that reach to the tip of the eyes, are armed with a spine at their distal extremity. The legs of the 2nd pair reach to the end of the scales, while those of the 3rd project with their chelae beyond them. The legs of the 4th pair are 72 mm. long, somewhat more than half as long as the body and extend with half their carpus beyond the antennal scales; carpus and merus have the same length, viz. 24 mm., the dactylus measures little more than one-fourth the propodus. The 5th legs are missing.

The genital tubercles on the 3rd pair are nearly as long as broad, shorter than those of *Halip. aequalis*. The tubercle, situated immediately behind them between the legs of the 4th pair, terminates in a sharply-pointed, compressed tooth, that is curved forward and the posterior margin of which is sharp; the coxae of the 4th legs carry a very small acute tooth at their antero-internal angle. The prominent tubercle between the legs of the 5th pair is sharply carinate in the median line, the carina being arcuate from before backward.

Remarks. This specimen was captured together with the two females of *Halip. aequalis*, described above. Alcock supposes that both species are identical, but they are, no doubt, different. The sternal tubercles of the female are quite different in both species. *Halip. obliquirostris* bears a distinct post-rostral ridge, the antennular peduncle is longer, like also the telson, the fingers of the 1st pereiopods are as long as the palm, but in the female of *Halip. aequalis* twice as long as it and perhaps there are still more differences.

General distribution: Off the Kermadec Islands (Spence Bate).

11. *Haliporus neptunus* Sp. Bate.

C. Spence Bate, Report Challenger Macrura, 1888, p. 291, Pl. XLII, Fig. 3.
A. Alcock, Catal. Indian Deep-Sea Crustacea, Calcutta, 1901, p. 24.

Stat. 314. February 17. 7° 36′ S., 117° 30′.8 E. Flores Sea. 694 m. Fine, sandy mud. 1 young male.

This specimen is about 40 mm. long, unfortunately it is much damaged. The legs of

the 5th pair are, from their base to the end of the carpus, 26 mm. long (the two last joints are missing), a distance about as long as that from the tip of the rostrum to the 5th abdominal somite. The carapace is broken, but the rostral carina reaches to nearly the posterior margin of the carapace. The two branches of the petasma are not yet united.

Characteristic of this species is its rusty yellow colour in spirit.

General distribution: Off the Aru Islands (Spence Bate); off the Philippines (Spence Bate); Bay of Bengal (Alcock).

†12. *Haliporus Sibogae* de Man.

J. G. de Man, in: Notes from the Leyden Museum, Vol. XXIX, 1907, p. 138.

Stat. 38. April 1. 7° 35'.4 S., 117° 28'.6 E. Flores Sea. 521 m. Coral. 13 males, 10 females.
Stat. 74. June 8. 5° 3'.5 S., 119° 0' E. Strait of Makassar. 450 m. Globigerina ooze (obviously a thin layer). 13 males, 11 females.
Stat. 212. September 26. 5° 54'.5 S., 120° 19'.2 E. Banda Sea. 462 m. Fine grey and green mud. 1 very young female.
Stat. 256. December 11. 5° 26'.6 S., 132° 32'.5 E. Near Kei Islands. 397 m. Greyish green mud. 1 male, 4 females.

A remarkable new species of the same large size as *Halip. robustus* (S. I. Smith), the male attaining a length of 165 mm. (carapace with the rostrum 52 mm., abdomen 113 mm.), the female one of 175 mm. (carapace with the rostrum 58 mm., abdomen 117 mm.), but appertaining to Professor Bouvier's second section of the genus, a section represented by two species in the tropical and subtropical Atlantic, but not yet observed in the Indopacific. Carapace, rostrum included, about one-third the total length, cylindrical, nearly as high as broad, slightly narrowed in front. The entire surface of the carapace, the abdomen and some appendages are densely covered with a close tomentum of very short, curved setae; these setae are 0,2—0,22 mm. long and on either side beset with smaller setulae, that regularly become shorter towards the extremity. Rostrum, as in *Halip. curvirostris* Sp. Bate, falciform, at first ascending until just beyond the middle, then curved downwards: it usually reaches just beyond the 1st joint of the antennular peduncle, sometimes to the middle of the 2nd, in one adult male it extends even to the far end of this joint. In addition to a small, epigastric tooth, one and a half as far distant from the frontal border of the carapace as from the upper extremity of the cervical groove, the upper margin of the rostrum is armed usually with 6 teeth, sometimes with 7 and in two females even with 8; the rostrum of a male and of a female, that bears only 5 teeth, is probably abnormal. Of these teeth the small first one is situated on the carapace, immediately behind the frontal border, its distance from the likewise small 2nd tooth measures about two-thirds the distance between the 1st tooth and the epigastric tooth; the 3rd is half as far distant from the 2nd tooth as the 2nd from the 1st, the distances between the following are smaller, often progressively decreasing, often unequal, rarely, as in an adult male from Stat. 38, the foremost tooth appears slightly longer than the penultimate. The three or four anterior teeth are usually slightly larger than the 1st and the 2nd; the foremost tooth is as far distant from the tip of the rostrum as from the penultimate, sometimes the foremost tooth

appears a little longer, sometimes shorter than its distance from the extremity of the rostrum. Whereas the upper margin is more or less strongly curved, the lower is more or less distinctly concave; it is usually armed near the tip with one tooth, often smaller than those of the upper border, more rarely with two teeth, that are situated near one another.

The toothing-formulae of 42 specimens are the following:

$\frac{6+1}{1}$ in 12 males and 9 females.

$\frac{6+1}{2}$ in 3 males and 2 females.

$\frac{7+1}{1}$ in 4 males and 6 females.

$\frac{7+1}{2}$ in 1 male and 3 females.

$\frac{8+1}{1}$ in 1 female.

$\frac{8+1}{2}$ in 1 female.

The rostrum that measures a little more than one-third the rest of the carapace, gradually narrows distally, its height at the base being one-fourth its length. The sides of the rostrum are grooved from the tip to the base; this groove, that gradually widens backward, is defined by two ridges, of which the upper is rounded and broader than the lower, that is situated much nearer to the lower than to the upper margin of the rostrum. The rostral carina does not extend backward beyond the epigastric tooth, it disappears even before reaching the level of the cervical groove; behind the latter the carapace is rounded, as in *Halip. modestus* (S. I. Smith) and it appears here also slightly convex longitudinally.

Outer orbital angle rounded, little prominent. The spiny armature of the carapace, agreeing with that of *Halip. diomedeae* Faxon (in: Memoirs Museum Comp. Zool. at Harvard Coll. Vol. XVIII, 1895, p. 186, Pl. G), consists of a tolerably strong and well buttressed, post-antennular (antennal) spine, a much smaller branchiostegal spine on the antero-inferior angle of the carapace at the anterior end of the subhepatic groove, a hepatic spine as small as the branchiostegal, a fourth, a little larger, situated behind the antennal spine, nearly in the same horizontal line, though a little below it and one and a half as far distant from it as from the cervical groove, finally a fifth spine, the smallest of all, in the same horizontal line as the antennal spine, immediately behind the cervical groove. Cervical groove well cut, extending up to near but not across the dorsal median line of the carapace, which it therefore does not indent; its antero-inferior portion (or subhepatic groove) is also well developed and terminates immediately behind the branchiostegal spine. The transverse branchiostegal groove, that runs just below the hepatic spine and anteriorly unites with the cervical groove, is as much developed as the subhepatic and ends just behind the level of the 5th spine described above; a little farther backward this furrow reappears as the branchio-cardiac groove, which in a sinuous course runs obliquely upward and backward to near the posterior margin of the carapace. This groove, less deep than the cervical furrow, in some specimens ends abruptly not far from the posterior margin of the carapace, while in other ones it gradually widens backward and gradually fades away. In the very young specimen from Stat. 212 the branchiostegal and the branchio-cardiac groove are continuous, not separated from one another. The arcuate, antennal

groove by which the antennal and the gastric region are separated from one another and which is a continuation of the longitudinal groove on the sides of the rostrum, is rather deep but does not reach farther backward and downward than the line uniting the antennal spine with the fourth spine described above. A shallow impression is seen between the orbital and gastric regions. The sinuous submarginal ridge of the carapace is prominent and conspicuous.

The 1st—3rd abdominal somites are rounded, the 4th—6th are sharply carinate and their carinae terminate in a small tooth; rarely the 3rd tergum shows obscure traces of a partial carination, especially posteriorly. The 3rd abdominal somite is a little longer than the 2nd; the 6th somite, almost one and a half as long as the 5th, is but one-fifth longer than high and strongly compressed, being just half as thick as high. Telson little (about one-sixth) longer than the 6th somite, with shallow dorsal and lateral grooves and with one pair of small, acute immovable spines just near the spiniform tip. Abdominal pleura rounded posteriorly, those of the 6th somite with an extremely small, acute tooth at the posterior end of the arcuate lower margin. Inner uropod lanceolate, a little more than 3-times as long as broad, extending with one-third or one-fourth its length beyond the tip of the telson; the outer uropod which is 4-times as long as broad and obtusely pointed at the tip, surpasses the inner as far as the latter does reach beyond the telson.

Eyes large, reniform, black, the major diameter of the cornea twice as broad as the peduncle; the eyes are flattened above and carry a minute tubercle at the inner side.

First joint of antennular peduncle a little longer than half its length; its outer border is deeply notched at the base by a small, narrow incision, just near the antennal spine of the carapace, and terminates at the far end in a small spine; usually a still smaller spine, followed by a very small incision, occurs on the outer margin, about in the middle, somewhat nearer to the basal incision as to the far end, but in other specimens this small spine (the stylocerite) and this incision are indistinct. The hairy lamelliform appendage, the prosarthema, is usually a little shorter than the eyes, that part which is visible from above, is narrow, pointed, with a sharp, arcuate, outer margin. The three-sided 2nd article is less than half as long as the 1st and very hairy, the 3rd is somewhat shorter than the 2nd. The two flagella are filiform, both, as in *Halip. diomedeae*, considerably longer than the body and probably of equal or subequal length: so e. g. in a male, long 155 mm., the upper flagellum is 180 mm. long, the lower (not complete) 150 mm.; in an adult female, long 175 mm., the lower flagellum measured 190 mm., in another female, long 145 mm., the upper 175 mm. The upper flagellum is thinner than the other; a proximal portion is slightly broadened and compressed, this broadened portion consists of 25 or 26 joints and is a little more than half as long as the peduncle; it is 14 mm. long in a male, the upper flagellum of which is 180 mm. long and the peduncle 22 mm. The lower margin of this broadened part is hairy at the outer side. The lower flagellum is thicker at the base than the other, but it tapers rapidly; at the lower side of the base one observes long, olfactory hairs.

Basal joint of outer antennae with a small spine at the outer angle, the peduncle is a little shorter than the eyes and the flagellum is very long, 3-times as long as the body: so e. g. in a female, long 146 mm., this flagellum measured 450 mm. The scaphocerite that exceeds

the antennular peduncle by one and a half or sometimes even almost by twice the length of the 3rd joint, is as long as the outer uropod; it is in the male little more than twice, in the female $2^1/_2$-times as long as broad.

The hairy mandibular palpi reach, both in the male and in the female, to the base of the antennal scales; the 1st or proximal joint is $2^1/_2$-times as long as broad, it shows its greatest width at the posterior third and gradually narrows forward, but more rapidly backward and the lower or outer surface is slightly concave; the likewise tapering, 2nd joint is little more than half as long as the preceding and much narrower. The epipod of the 1st maxillipeds is divided, by an incision on its outer border, in a larger posterior and a smaller anterior portion; the 3rd or 4th distal part of the exopod tapers to the pointed tip. The 3rd joint of the endopod, almost as long as the following joints combined, is curved, its inner margin concave, the outer convex; the two following joints are short, the 4th somewhat longer than the 5th, the tapering penultimate joint is one and a half as long as the two preceding combined and as the terminal joint.

The merus of the 2nd maxillipeds is 3-times as long as broad, the penultimate joint much broader but almost as long as the carpus, while the terminal joint is a little longer.

The external maxillipeds reach in the male with half or with the whole terminal joint beyond the tip of the antennal scales; the terminal joint, slightly compressed like the preceding, is a little shorter than the penultimate, 6-times as long as broad and the apex is obtuse; in the female these foot-jaws project also with more than half or with the whole terminal joint beyond the scales and this joint, here also a little shorter than the penultimate, is much slenderer than in the male, being 14- or 15-times as long as thick.

The 2nd and the 3rd joint of the 1st pair of legs that reach about to the end of the antennal peduncles, carry each a very small, subterminal spinule; the merus is armed with 4 or 5 small spinules along the lower margin of its outer face; the carpus, nearly twice as long as the chela, is a little longer than the merus and the fingers are about one and a half as long as the palm.

The legs of the 2nd pair extend to the distal third or fourth part of the antennal scales; the carpus of these legs that are unarmed, is one and a half as long as the merus and 3-times as long as the chela; fingers a little longer than the palm.

The legs of the 3rd pair, also unarmed, reach, in the male with the fingers, in the female with the chela or even a little more, beyond the antennal scales; the carpus, that, as in the 2nd pair, is a little dilated proximally, is one and a half as long as the merus and $3^1/_2$-times as long as the chela.

The coxa of the 4th legs bears a small, conical tooth at its antero-internal angle, behind which one observes, in the female, a somewhat larger tubercle; these legs that extend, when straightened, to the apex of the antennal scales or project with their propodus or a part of it beyond that apex, do not surpass the legs of the 3rd pair; the carpus, a little shorter than the merus, is almost 3-times as long as the propodus and the dactylus is somewhat more than half as long as the preceding joint.

The legs of the 5th pair, in the male a little more than half as long as the body,

while in the female they measure about two-thirds of it, are filiform and the longest of all, projecting by one-half to three-fourths their carpus beyond the antennal scales; in the male the coxa is strongly dilated at the inner side and its anterior margin bears a lamelliform process with truncate or obtuse tip and slightly turned outward; in the female the coxa is not dilated, but it carries at its antero-internal angle a small, sharp tooth, somewhat larger than that which exists on the coxa of the 4th pair, but with no tubercle behind it. The carpus, sometimes (in some males) distinctly shorter than the merus, in other specimens barely shorter or of equal length, appears, in the male, 3-times, in the female $3^1/_2$-times as long as the two last joints taken together and the dactylus is a little more than half as long as the propodus.

In the male the sternum carries, between the legs of the 3rd pair, a tubercle that is sharply carinate and compressed medially like a forwardly directed tooth and a similar larger tubercle between the legs of the 4th pair is produced into a strongly compressed, lamelliform tooth, the pointed tip of which is also directed forward; between the legs of the 5th pair the median carina is low and obtuse, in younger males sharp and in still younger ones it rises into a compressed carinate tooth that is directed forward and that is smaller than the tooth on the preceding somite.

Each of the two branches of the petasma is folded longitudinally in two folds of which the anterior is much narrower distally than the posterior; the tooth-like process on the inner border of the basal joint is rounded. The sternum of the 1st abdominal somite bears between the base of the pleopods a transverse, compressed tubercle, that is carinate posteriorly in the middle, the carina that is strongly compressed, being rounded. A smaller acute tooth exists between the pleopods of the 2nd pair and a still smaller one between those of the 3rd; all these teeth are in the female smaller than in the male.

In the female the posterior margin of the penultimate thoracic sternum is prominent and overhangs the sternum of the last somite; the sternum of the penultimate somite bears a strongly compressed tooth or process that reaches to the dilated coxae of the 3rd pereiopods. The sterna of the three preceding somites are also carinate in the middle and the median crest of the 3rd somite forms posteriorly an obtuse tooth. The sternum of the posterior segment rises into a tubercle rounded both transversely and longitudinally; this tubercle appears sometimes obscurely carinate longitudinally and usually occupies the whole interspace between the 5th legs. When this is not the case, the tubercle appears quadrangular, a little broader than long or sometimes longer than broad; sometimes it appears rhomboid, the two anterior sides making a right angle with one another and separated by grooves from the rest of the sternum. The branchial formula is the following:

	Somites.							
	VII.	VIII.	IX.	X.	XI.	XII.	XIII.	XIV.
Pleurobranchiae:	0	0	1	1	1	1	1	1
Arthrobranchiae:	1 (small)	2	2	2	2	2	2	0
Podobranchiae:	0	1	0	0	0	0	0	0
Epipods:	1	1	1	1	1	1	1	0

The branchial formula differs from that given by Bouvier as characteristic of this genus

(in: Bull. Mus. Océan. Monaco, 1906, p. 81) by the existence of a small, though functional arthrobranchia on the VIIth somite. The exopods of the 2nd and 3rd maxillipeds and of all the thoracic legs are quite rudimentary, being 0,75—1 mm. long, and may easily be overlooked.

13. *Haliporus Lucasii* (Sp. Bate).

Solenocera Lucasii C. Spence Bate, in: Ann. Mag. Nat. Hist. (5) Vol. 8, 1881, p. 185.
Philonicus Lucasii C. Spence Bate, Report Challenger Macrura, 1888, p. 277, Pl. XLII, Fig. 4.
Nec: *Solenocera lucasii* E. J. Miers, in: Proc. Zool. Soc. London, 1884, p. 15.
Nec: *Solenocera lucasii* M. J. Rathbun, in: U. S. Fish Commission Bull. for 1903, Pl. III, Wash. 1906, p. 904, Pl. XX, Fig. 9.

Stat. 65^{a}. May 6. Near Tanah Djampeah. From 400 m. upward to 120 m. Pale, grey mud, changing during haul into coral bottom. 1 young male.
Stat. 159. August 16. 0° 59′.1 S., 129° 48′.8 E. Halmaheira Sea. 411 m. Coarse sand. 1 very young specimen.

The male from Stat. 65^{a} is 66 mm. long, the carapace, rostrum included, being 18 mm. long, without the rostrum 13,3 mm.; the female that hitherto was known alone, attains, however, a length of 100 mm. The rostrum, which is quite horizontal, reaches the far end of 1st antennular article, just exceeding the eyes. Of the 7 teeth four are situated on the carapace; the teeth are nearly equidistant, the 2nd being not so far distant from the 3rd as in Bate's figure. The rostral crest is produced until to the cervical groove, behind the groove the carapace is rounded. Anteriorly near the rostral crest and between the lateral spines the carapace is somewhat pubescent, but posterior to the cervical groove it seems to be glabrous. Antennal spine small, just behind it and nearly in the same horizontal line, another somewhat larger spine, the post-orbital; the distance between the tips of these two spines is hardly one-fourth the interspace between the tip of the post-orbital spine and the cervical groove. The branchiostegal spine, about 1 mm. distant from the rounded, antero-lateral angle of the carapace, has the same size as the post-orbital, the hepatic spine is smaller. The cervical groove is deep and distinct up to the gastric carina; just below the hepatic spine runs a short, also rather deep, transverse groove (S. hepaticus Stimpson), that anteriorly meets the cervical groove, while it extends backward hardly beyond the level of the 1st tooth of the rostrum. The abdomen is carinate from the 3rd somite backward, the carina of the 3rd somite is, however, less sharp than that of the three following somites. Spence Bate describes the telson of his single specimen, a female, as truncate, but the pointed extremity was no doubt broken off. In the specimen from Stat. 65^{a} the telson tapers to a point and is almost 1,5 mm. shorter than the inner uropod, while the inner uropod is just as much shorter as the outer, to the terminal third of which the telson reaches; the telson is broadly grooved from its base to the level of the lateral spines that are observed at one-third of its length from the tip. As in *Trachypenaeus curvirostris* (Stimps.), the pleura of the 1st abdominal somite bear a short fissure, that runs from the lower margin upward, a little behind the middle.

Though the eyes are of moderate size, the major diameter of the cornea is twice as long as the stalk is broad. The lower antennular flagellum that alone is present, is 18 mm. long, just as long as the carapace, rostrum included, and more than one and a half as long as the

peduncle, which is 11 mm. long; this flagellum is cylindrical, not at all compressed, and regularly tapers to the extremity. The antennal peduncle reaches to the middle of the 2nd antennular article, the flagellum is missing; the antennal scale narrows rather considerably towards the apex, its greatest width (3 mm.) at the base is hardly one-third the length (10,25 mm.); the straight outer margin is not curved inward distally and the distal spine distinctly projects beyond the obtuse apex of the lamellar portion. Mandibular palp a little shorter than the antennal peduncle; the 2nd joint, 3,5 mm. long, is barely shorter than the 1st or proximal joint, but only half as broad; the 2nd joint shows its greatest width posteriorly and gradually narrows towards the obtuse tip.

The external maxillipeds reach just beyond the antennal scales. The 1st pair of legs reach to the end of the eyes, both the 2nd joint and the ischium are armed at the far end with a slender spine, but the merus, which is just as long as the carpus, bears a similar spine on the middle of its lower margin; the fingers are almost twice as long as the palm. The legs of the 2nd pair, that just extend beyond the antennal peduncles, are armed with a similar, slender spine at their base, but those of the 3rd are unarmed. The 4th legs, 25 mm. long, reach to the distal end of second antennular article; the carpus is one-third longer than the merus, the propodus half as long as the merus and one and a half as long as the terminal joint. The slender filiform legs of the 5th pair are 40 mm. long, twice as long as the carapace, rostrum included, and reach with three-fourths of their propodi beyond the antennal scales; merus, carpus, propodus and dactylus are respectively 10 mm., 11,5 mm., 11,25 mm. and 1,5 mm. long. In Fig. 4 of the Challenger Report the propodus of the 5th legs has not been figured! In all the pereiopods the coxae carry a small, acute, conical tooth anteriorly, more developed on the 4th and 5th legs than on the three chelipeds.

The exopod of the outer maxillipeds extends along hardly more than one-third the ischium, while the exopods of the legs progressively decrease in length, though very little.

The two plates of the petasma are not yet united, their distal extremity is slightly emarginate; the inner margin of the basisal joint carries a sharp, conical tooth at its far end near the insertion of the petasma. The sternal ridge that unites the pleopods of the 1st, 2nd and 3rd pairs carries a subacute, compressed tooth in the middle; these teeth progressively decrease in size from the 1st to the 3rd.

The other specimen is much younger, the carapace with the rostrum being only 9 mm. long, the seven teeth of the rostrum are arranged as in Fig. 4 of the Challenger Report.

Remarks. *Solenocera lucasii* Miers 1884 from Mauritius (l. c.) is certainly another species, because it has no pterygostomian spine; this spine, however, is described by Spence Bate, l. c. p. 278: "There is also a spine on the hepatic region and one submarginal in advance of it below". For the same reason Miss Rathbun was in the wrong when (l. c.) referring a species from the Hawaiian Islands to *Solenocera lucasii*, because in that species there was also no branchiostegal spine.

Halip. malhaensis Borr., only known by one female dredged in 145 fathoms off Saya de Malha, is apparently closely related to *Halip. Lucasii* (Sp. Bate) and I should have identified both species, but neither the 4th nor the 5th legs are "particularly slender" in the species from

Saya de Malha, while in *Halip. Lucasii* the legs of the 5th pair are very slender, elongate and filiform. I may call, however, the attention to the fact that, in the figure of *Halip. malhaensis*, the propodi of the 4th and of the 5th legs are evidently not figured! (L. A. Borradaile, in: Trans. Linnean Soc. London, 2nd Ser. Zool. Vol. XIII, 1910, p. 258, Pl. 16, fig. 2).

General distribution: Off the Kei Islands, South of Papua (Spence Bate).

Solenocera H. Luc.

Of the genus *Solenocera*, at first sight recognizable by the flagella of the upper antennae, that are foliaceous and channelled along their inner surface, thus forming a tube by their apposition, at present 9 species are known, including the two new ones discovered by the "Siboga". All these species are confined to the Indopacific, excepting *Sol. membranacea* (H. M.-Edw.), which occurs in the Mediterranean, in the East Atlantic from Ireland to Morocco, at the Azores and even in the Gulf of Paria off the island of Trinidad. Two species are inhabitants of the coasts of Japan, viz. *Sol. distincta* (de Haan) and another, which was described in 1884 by the late Dr. Koelbel of Vienna under the same name, but for which I propose the name of *Sol. Koelbeli*, because it is not identical with the species described by de Haan. *Sol. Agassizii* Fax. occurs on the west coast of Central America. *Sol. pectinata* (Sp. Bate), the two new species, discovered by the "Siboga", *Sol. Melantho* and *Sol. Faxoni*, and probably also *Sol. crassicornis* (H. M.-Edw.), which, according to Professor Bouvier, occurs in Indo-Malaysia, are the three or four inhabiting the East Indian Archipelago. *Sol. Hextii* W.-Mas., finally, has been recorded from the Bay of Bengal and from the Arabian Sea.

Sol. crassicornis and the two japanese *Solenocerae* are littoral or sublittoral species, only found in shallow water. *Sol. pectinata* has not been captured deeper than about 100 meter. The other species were collected in deeper water, so the new *Sol. Faxoni* at a depth of 310 m., and the new *Sol. Melantho* in water of 216—274 m. The mediterranean species, finally, was taken between 503 and 760 m., but also, in the Gulf of Paria, at a depth of 31 fathoms.

†14. *Solenocera pectinata* (Sp. Bate).

Philonicus pectinatus C. Spence Bate, Report Challenger Macrura, 1888, p. 279, Pl. XXXVIII.
Philonicus pectinatus J. G. de Man, in: Max Weber's Zoolog. Ergebn. Reise Niederl. Indien, 1892, p. 515.
Philonicus cervicalis L. Zehntner, Crustacés de l'Archipel Malais, Genève 1894, p. 210, Pl. IX, Fig. 26—26*c*.

Stat. 64. May 4/5. Kambaragi-bay, Tanah Djampeah. Depth up to 32 m. Coral, coralsand. 1 very young male.
Stat. 121. July 14/16. Menado-anchorage. 55 m. 1 female.
Stat. 167. August 22. 2° 35′.5 S., 131° 26′.2 E. Ceram Sea. 95 m. 1 young male.
Stat. 179. September 2/3. Kawa-bay, west coast of Ceram. Reef. 2 females.
Stat. 204. September 20. 4° 20′ S., 122° 58′ E. Between islands of Wowoni and Buton; northern entrance of Buton-strait. From 75—94 m. Sand with dead shells. 1 male, 1 female.

The two specimens from Stat. 204 are adult, the male 50 mm. long, the female 54 mm., and will therefore be described more in detail. The single specimen, a male, that was collected

by the "Challenger", measured 38 mm. and the specimens from the island of Flores, described by me in 1892, were still younger.

Carapace nearly one-third the total length, smooth and glabrous like the abdomen. Rostrum, both in the male and in the female from Buton-strait, a little shorter than the eyes, projecting straight forward, acute, 6 + 1 toothed; the epigastric tooth, a little smaller than the first tooth on the straight, horizontal, upper margin, is slightly farther distant from the frontal margin of the carapace than from the cervical groove. The six teeth are equidistant, two are situated on the carapace, the 3rd above the frontal margin; they gradually decrease in size from the 1st to the 6th and the distance between the 1st and the epigastric tooth measures two-thirds the distance between the latter and the cervical groove; the foremost tooth is twice as far distant from the tip as from the penultimate. The lower margin of the rostrum is slightly emarginate at the base and curves upward to the tip.

Orbital angle not dentiform, post-antennular (antennal) spine rather small; behind and just above the latter is situated the post-orbital spine that is a little larger; hepatic spine of the same size as the antennal, no branchiostegal or pterygostomian spine, but the prominent, posterior margin of the subhepatic groove, i. e. the anterior part of the cervical groove, overhangs somewhat the rounded antero-inferior angle of the carapace as an obtuse, but dentiform lobe, around which the subhepatic groove curves backward before reaching the margin of the carapace. As in *Sol. Melantho*, there is a distinct, though shallow groove running transversely a little way behind and below the post-orbital spine and meeting the cervical groove just in front of the hepatic spine. The branchiostegal groove runs horizontally backward below the hepatic spine, but it does not extend beyond the upper extremity of the cervical groove. The deep, cervical groove does not indent the upper border of the carapace; its upper extremity is decidedly farther distant from the posterior margin of the carapace than from the anterior. The rostral crest terminates near the extremity of the cervical groove, posterior to it the carapace is rounded. Fourth, fifth and sixth abdominal terga sharply carinate, the third is also carinate, but the carina is much less prominent and disappears before reaching the anterior margin; the third tergum is one and a half as long as the second, which is 4-times as long as the first. Sixth somite one and a half as long as the fifth and about as long as the telson; the telson that reaches to the distal third of the inner uropod and just beyond the middle of the outer, is distinctly channelled and carries two small spines at the posterior fourth. Eyes large, reniform; basal joint of the eye-peduncles with lamelliform tooth or process on the inner side above; terminal joint with a minute tubercle on the inner margin.

Antennular peduncle somewhat shorter than the scaphocerite, measuring two-thirds the length of the carapace, without the rostrum; prosarthema somewhat shorter than the eyes. Flagella of equal length, as long as the carapace without the rostrum; both are compressed, the lower, convex on the outer and concave on the inner side, is nearly one and a half as broad as the upper, both end abruptly-acuminate, but, while the upper appears equally broad along its whole length until close to the tip, like a band, the other distinctly narrows distally; the four flagella form together an efferent branchial tube, characteristic of the genus.

Basal joint of outer antennae with a small spine at the outer angle, peduncle as long

as 1st antennular article; flagella of the female 4,5-times as long as the body; antennal scales distinctly narrowing, with the rounded apex reaching just beyond the small spine at the far end of the straight outer margin.

External maxillipeds slender, pediform, projecting in the male with their terminal joint beyond the antennal scales, in the female even with two-fifths of the propodus. Pereiopods slender. Of the chelate legs that strongly increase in length from the first to the third, the first that are bispinose, while the following are unarmed, hardly attain the far end of the antennal peduncle, while the third extend with their chelae and, in the male with one-sixth, in the female with one-fifth of their slender carpus beyond the scales. The elongate fifth legs project, in the male, with their dactyli and three-fourths of their propodi beyond the antennal scales.

There are exopods on all the thoracic legs; epipods everywhere present, except on the first maxillipeds and on the fifth pair of legs. The branchial formula seems to be typical (confer: Alcock, Catal. Indian Deep-Sea Crust. 1901, p. 20).

The petasma agrees with Bate's figure but the spines on the distal half of the spiniferous portion are more equal in length, the posterior being little shorter than the anterior; the spines on the proximal half are much longer anteriorly than in Bate's figure and they become gradually shorter posteriorly, while in the quoted figure on the contrary they grow longer backward. Similar spinules occur also on the lateral faces of the anterior spiniferous part of the organ and are here arranged in a curved line.

As regards the thelycum, I will observe that there is a vertical plate immediately behind and contiguous to the coxae of the 4th pair, that the sternum of the last thoracic somite bears two small rounded tubercles separated by a groove and that the posterior wall appears like a gate, the two lateral parts of which curve backward and outward behind the coxae of the 5th legs.

The male from Stat. 167 is much younger, 27 mm. long, but the petasma is already developed. Rostrum 7 + 1 toothed. The antennular flagella are comparatively much longer than in the adult male, described above, being almost twice as long as the carapace without the rostrum. The rostrum of the larger female from Stat. 179 that is 48 mm. long, is 9 + 1 toothed, the acute tip is slightly upturned at the apex; antennular flagella barely longer than the carapace without the rostrum. In the other somewhat younger female the rostrum is 8 + 1 toothed, flagella little longer than the carapace.

The female from Stat. 121 is 45 mm. long; rostrum 8 + 1 toothed, acute tip upturned; antennular flagella still almost one and a half as long as the carapace without the rostrum.

I am indebted to the courtesy of Professor Bedot of Geneva for having been enabled to examine the single type of *Philonicus cervicalis* Zehntner, a female from Amboina: the examination not only proved that Zehntner's species is a true *Solenocera*, but even that it is identical with *Philonicus pectinatus* Sp. Bate. The words "le filament supérieur (des antennes internes) est filiforme" in Zehntner's description are wrong and suitable to lead astray, for "filiforme" means cylindrical, whereas the upper flagellum is in reality compressed, flattened and like a band, as in the most typical Solenocerae.

General distribution: Arafura Sea, South of Papua (Spence Bate); Flores, Maumeri (de Man); Amboina (Zehntner).

15. *Solenocera*, sp.

Stat. 19. March 19/21. 8° 44′.5 S., 116° 2′.5 E. Bay of Labuan Tring, west coast of Lombok. 18—27 m. River-mud, coral, coralsand. 1 male and 2 females.
Stat. 64. May 4/5. Kambaragi-bay, Tanah Djampeah. Depth up to 32 m. Coral, coralsand. 1 male.
Stat. 153. August 14. 0° 3′.8 N., 130° 24′.3 E. Halmaheira Sea. 141 m. Fine and coarse sand with dead shells. 1 mutilated specimen, perhaps belonging to this species.
Stat. 294. January 23. 10° 12′.2 S., 124° 27′.3 E. Timor Sea. 73 m. Soft mud with very fine sand. 1 female.

These specimens that are all young and much injured, are probably to be regarded as individual varieties of *Sol. pectinata* (Sp. Bate). In these specimens the prominent, posterior margin of the subhepatic groove, i. e. the anterior part of the cervical groove, runs straight downward and forward to just near the rounded, antero-inferior angle of the carapace, forming here no obtuse, dentiform lobe, because the groove does not curve around it, before reaching the edge of the carapace. In some specimens, as in the female from Stat. 294, the carina of the 3rd tergum is more prominent; in this female the telson is longer than in the typical species, being as long as the inner uropod, but shorter than the outer. In this specimen the antennular peduncles are missing, but in the larger female from Stat. 19, which for the rest does not differ, the antennular peduncles reach nearly to the apex of the antennal scales, while in *Sol. pectinata* they are much shorter. In this female from Stat. 19 the carapace, rostrum excluded, is 9,75 mm. long, measured near the dorsal line, and the antennular flagella, that resemble those of *Sol. pectinata*, are 22,5 mm. long, more than twice as long as the carapace. In the other female from Stat. 19 the carapace is 6 mm. long without the rostrum, and the antennular flagella measure 15,75 mm.

In the young male from Stat. 64, that was taken together with a specimen of *Sol. pectinata*, the carapace without the rostrum is 7 mm. long, the antennular flagella measure 9,5 mm. and the 3rd abdominal tergum is not carinate.

† 16. *Solenocera Melantho* de Man.

J. G. DE MAN, in: Notes from the Leyden Museum, Vol. XXIX, 1907, p. 137.

Stat. 302. February 2. 10° 27′.9 S., 123° 28′.7 E. Near Rotti Island. 216 m. Sand and coralsand. 1 adult female.
Stat. 306. February 8. 8° 27′ S., 122° 54′.5 E. Lobetobi Strait. 247 m. Sandy mud. 9 males, 6 females.
Stat. 312. February 14. 8° 19′ S., 117° 41′ E. Saleh-bay, north coast of Sumbawa. 274 m. Fine, sandy mud. 2 males, 2 females.

In its outer appearance *Sol. Melantho*, of which the male attains a length of 100 mm., the female one of 132 mm., much resembles a species from Japan, which, in 1884, was wrongly referred by CARL KOELBEL to *Sol. distincta* (de Haan). I am indebted for this knowledge to Dr. HORST of the Leyden Museum, who kindly compared for me the Siboga species and KOELBEL's description (in: Sitzungsber. K. Akad. Wiss. Wien. Bd. XC. 1884, p. 314, Taf. II, Fig. 1—7) with the single type, a female, of *Penaeus distinctus* de Haan: I propose therefore for KOELBEL's species the name of *Sol. Koelbeli*.

The body of *Sol. Melantho* is smooth, glabrous. The carapace, rostrum included and measured near the dorsal line, is long one-third the total length; the carapace is distinctly compressed, its height being in proportion to its transverse diameter as 5 : 4. Abdomen twice or little more than twice as long as the carapace. The rostrum is short, reaches to the tip of the eye-peduncles, often hardly as far, and measures in adult specimens one-third the rest of the carapace, while in younger individuals it appears comparatively a little longer; its form is rather stout, the height near the base (the teeth included) being one-third its length or sometimes even more. The slightly ascending, upper margin is armed with 8 or 9 strong teeth that reach to the tip; sometimes the foremost tooth is as far distant from the tip as from the penultimate tooth, sometimes twice as far, and in other specimens it is farther distant from the penultimate tooth as from the tip. The three first teeth are situated on the carapace, the 4th just above the orbital margin; the 1st tooth is one and a half as far distant from the 2nd as the 2nd from the 3rd and the distances between the following teeth slightly become shorter distally. Post-rostral carina not interrupted by the cervical groove, very prominent and reaching to near the posterior margin of the carapace. The lower margin of the rostrum, more ascending than the upper, appears very slightly concave in the middle; it is unarmed and fringed with long hairs. The lateral sides of the rostrum are tomentose above the lateral ridge, that is hardly traceable to the acute tip, as it fades away just below the foremost tooth.

Orbital angle more or less dentiform and sharp. Post-antennular (antennal) spine small; between this spine and the orbital angle another somewhat larger, the post-orbital spine, at some distance from the anterior margin of the carapace and situated nearer to the orbital angle than to the antennal spine; neither of them are produced backward as a carina. There is a small impression midway between the post-orbital spine and the rostrum. Hepatic spine small, of the same size as the antennal spine, situated much lower, in a horizontal line with the upper margin of the basal joint of the outer antennae. Cervical groove deeply cut, reaching upward to near the post-rostral crest, which it therefore does not indent; the upper extremity of the groove is situated immediately before the middle of the carapace. A narrow, but rather deep, transverse groove runs from just behind and below the post-orbital spine downward, meeting the cervical groove just in front of the hepatic spine; the subhepatic groove, i. e. the antero-inferior part of the cervical groove, is interrupted at some distance from the antero-inferior angle of the carapace and this angle is obtuse, with no spine. Between this angle and the interruption one observes a deep, circular concavity or pit as the continuation of the subhepatic groove. The anterior portion of the branchiostegal groove, below the hepatic spine, is deep and runs slightly upward, the posterior portion between the cardiac and branchial regions is also visible, though broader and shallow, but the middle part is inconspicuous. Besides the dentiform, orbital angle there are three spines on the side of the carapace.

Abdominal terga carinate from the 3rd to the 6th, except the anterior third part of the 3rd and the carina of the 6th terminates alone in a tooth. Sixth somite little longer than the 5th and one-fourth longer than high: in the adult female, long 132 mm., from Stat. 302, the 5th tergum is 13 mm. long, the 6th 14 mm. long and 11 mm. high; in the adult male from Stat. 312 these numbers are, in the same succession, 9,75 mm., 11,4 mm. and 7,5 mm., the

6th somite appearing here a little less high in proportion to its length. The telson, one and a third to one and a half as long as the 6th somite, reaches almost to the end of the outer uropod and as far as or just beyond the inner; it is deeply channelled and bears a pair of small spines at one-fourth of its length from the tip. The pleura of the 1st abdominal somite present a transverse suture on its lower part; they are rounded posteriorly like the following, except those of the 6th that are provided with a small spine at the postero-basal angle.

Eyes rather large, black, reniform; lamelliform plate on the upper face of the basal joint longer than broad, subacute, its arcuate, inner margin fringed with hairs: 2nd joint of the peduncle with a minute, conical tubercle at the inner side.

Antennular peduncle measuring two-thirds the length of the carapace, without the rostrum; length of the 2nd joint one-third that of the peduncle, this joint shorter than the 1st, 3rd joint half as long as the 2nd. Flagella slender, as in *Sol. siphonocera*, one and a half as long as the carapace without the rostrum; both flagella, abruptly-acuminate at the tip, are compressed, the longer upper flagellum that hardly narrows distally, flattened and half as broad as the lower that appears concave at the inner side and that distinctly is narrowed towards the tip.

Basal joint of outer antennae with a small spine at the outer angle, antennal peduncle as long as the eyes, flagellum 4-times as long as the body; scales 3-times as long as broad, projecting as far beyond the antennular peduncle as the 3rd joint is long; the obtuse, rounded apex of the lamella extends beyond the small terminal spine of the straight outer margin.

Second joint of the mandibular palp, that reaches to the base of the scaphocerite, twice as long as the first; the second joint, pointed at the tip and with the outer margin concave, is just half as broad as long. The exopod of the second maxillipeds, that resemble those of *Sol. Koelbeli* (Koelbel, l. c. fig. 5), reaches just beyond the middle of the merus. The third maxillipeds extend with their dactylus beyond the apex of the antennal scales; carpus a little longer than the penultimate joint and one and a half as long as the dactylus; exopod not yet reaching to the middle of the ischium.

The pereiopods of the 1st pair, armed with a strong, slender spine at the base and with a similar spine on the ischium, reach to the distal fourth part or, as in the adult female from Stat. 302, to the middle of the antennal scale; carpus a little longer than the merus, chela more than half as long as the carpus; fingers 2,5-times as long as the palm; chela usually more than 4-times as long as broad, sometimes, as in the adult female from Stat. 302, appearing less slender. The 2nd legs, unispinose at base, usually project, in the adult, with one-fourth or one-fifth of their carpal joints beyond the antennal scales; the carpus is one and a half as long as the merus and more than 3-times as long as the chela. The 3rd legs that are unarmed, extend with more than half the length of their carpal joints beyond the antennal scales; the carpi, almost twice as long as the meri, are almost 4,5-times as long as the chelae and near their proximal extremity 3-times as thick as there where they are thinnest. Like the other legs, also those of the 3rd pair are shorter in the adult female from Stat. 302, extending with less than half the length of the carpal joints beyond the scales, and this is also the case in young individuals. The legs of the 4th pair reach with their dactyli beyond the antennal scales; the lanceolate dactyli, which, like the propodi, are broadened, compressed and carinate in the middle

both on the upper and on the lower side, measure two-thirds the length of the penultimate joints. The 5th legs, finally, that are much thinner than all the preceding and nearly as long as the legs of the 3rd pair, reach with the two last joints beyond the scaphocerites; their slender dactyli are almost half as long as the slender, not broadened propodi, which are little shorter than the carpal joints.

In the male the coxae of the legs of the fifth pair are armed anteriorly with a sharp, compressed tooth, that is slightly turned outward; in the female this tooth is smaller, more slender.

The slender exopods of the 1st pair reach almost to the far end of the ischium, those of the following legs appear gradually shorter.

The two branches of the petasma are united anteriorly and terminate each at the distal end in three lobules; the anterior lobules that are truncate, are armed along their distal margin with minute spinules, a few partly larger spinules occur on the obtuse middle lobules and the posterior lobules that are hooky and curved outward, bear also a few sharp teeth; the lobules decrease in length from the anterior to the posterior. In young individuals, in which the carapace, rostrum included, is 22 mm. long, the two branches of the petasma are already united, but the small spinules are hardly developed.

In the female one observes, immediately behind the coxae of the 4th pair of legs, a vertical trapezoid plate, the upper margin of which bears two small subacute teeth or tubercles in the middle, while the outer angles are also dentiform; the submedian teeth are a little farther distant from the outer angles than from one another, and the divergent lateral margins of the plate are concave; between the legs of the 5th pair the sternum appears quadrangular, as broad as long, with upstanding margins, of which the lateral are slightly concave; between the anterior vertical plate and the quadrangular, horizontal, sternal plate are situated two small, oblong tubercles, in the middle near one another; the posterior border of the quadrangular plate i. e. the upper border of the posterior wall of the sternum, is notched in the median line and emarginate at either side, presenting therefore two rounded lobes in the middle. The slightly concave, lateral margins of the posterior wall of the sternum diverge backward, so that this wall appears broader posteriorly than anteriorly.

The branchial formula agrees with that given by Alcock (in: Catal. Indian Deep-Sea Crust., Decapoda Macrura and Anomala, 1901, p. 20), but somite VIII bears perhaps an arthrobranchia and a pleurobranchia instead of two arthrobranchiae and the VIIth somite seems to carry a quite rudimentary small gill, perhaps an arthrobranchia, as in *Sol. Koelbeli* de Man.

Remarks. This *Sol. Koelbeli* from Japan seems to be the most closely related species, it differs, however, from *Sol. Melantho* by the following characters. The cervical groove is not interrupted by the post-rostral carina, the antennular peduncle reaches to the apex of the antennal scales, the external maxillipeds extend only to the apex of the antennal scales, the thoracic legs are shorter, so e. g. those of the 5th pair reach only with their dactyli beyond the antennal scales, the mandibular palp has a somewhat different form and there are certainly still more differences.

Sol. distincta (de Haan), which is most closely allied to the mediterranean *Sol. siphonocera*, differs at first sight by the existence of a spine at the antero-inferior angle of the carapace,

by the different form of the rostrum, the lower margin of which is convex, curving regularly upward, while there are only two teeth on the upper margin, the 4th tooth of the six being situated above the frontal margin. In this species, as in *Sol. siphonocera*, a groove runs along the rostrum, but this groove does not exist in *Sol. Melantho*. The antennular peduncle reaches almost to the apex of the scales, the thoracic legs finally are shorter, those of the 5th pair reaching not beyond those of the 1st and the carpal joints of the 3rd pair are as long as their meri.

† 17. *Solenocera Faxoni* de Man.

J. G. DE MAN, in: Notes from the Leyden Museum, Vol. XXIX, 1907, p. 136.

Stat. 254. December 10. 5° 40′ S., 132° 26′ E. Near the Kei Islands. 310 m. Fine, grey mud. 1 female.

Unfortunately this single specimen is much damaged: the antennal flagella, the external maxillipeds and the thoracic legs are missing, while the caudal fan is much injured.

The carapace, rostrum included, is 23 mm. long, without the rostrum 19 mm., the length of the whole body probably 68 mm. Body glabrous, polished, except the rostrum the lateral faces of which are tomentose and the telson that is somewhat pubescent. The carapace, rostrum included, measures one-third the total length. Rostrum pointed, short, not yet reaching to the tip of the eyes; its upper margin, that is slightly directed downward, is armed with 6 teeth, that gradually decrease in size from the most posterior or first to the sixth; the three first teeth are situated on the carapace, the 1st tooth, almost one and a half as far distant from the cervical groove as from the 2nd tooth, is more than twice as far distant from the 2nd as the 2nd from the 3rd, and the distances between the following teeth also gradually become shorter. The lower margin of the rostrum is convex in the middle. The rostral carina reaches to the cervical groove, behind this groove the carapace is regularly rounded, without any trace of a post-rostral crest or ridge. The distance (10 mm.) between the upper extremity of the deep cervical groove and the orbital margin of the carapace is a little longer than the distance (9 mm.) between the former and the posterior margin of the latter. The cervical groove does not indent the rostral carina. No tooth at the orbital angle. Post-antennular (antennal) spine small, without a buttress, the antennal groove therefore hardly defined; behind and above it one observes the somewhat larger post-orbital spine, which is a little larger than the hepatic spine. That portion of the cervical groove that is situated between the hepatic spine and the upper border of the carapace runs as in *Sol. siphonocera*, specimens of which from the Gulf of Naples are lying before me. In this mediterranean species the subhepatic groove i. e. that portion of the cervical groove which is situated below the hepatic spine, ends abruptly at some distance behind the antero-inferior angle of the carapace, which is armed with a small pterygostomian spine; the carina defining the subhepatic groove posteriorly turns at an obtuse angle backward, without reaching the lower margin of the carapace. In *Sol. Faxoni*, however, the antero-inferior angle is rounded, presenting no pterygostomian spine; the straight carina defining the subhepatic groove posteriorly terminates, in this species, in a

strong, flattened, branchiostegal spine or tooth, which is larger than the other spines; this tooth overhangs and even reaches a little beyond the antero-inferior angle of the carapace. Branchiostegal groove, just below the hepatic spine, deep, running horizontally backward as far as the upper extremity of the cervical groove.

First, second and third abdominal terga rounded, the 3rd without any trace of a carina; 4th—6th terga strongly carinate, the carinae prominent, that of the 6th ending in a distinct tooth. The 3rd abdominal somite, 7,5 mm. long, is still longer than the 6th, that measures 6,5 mm., i. e. about one-third the carapace without the rostrum; the lower margin of the 6th pleura carries a subterminal spinule. The telson which is deeply grooved, is broken off in the middle and the caudal swimmerets are too much injured to be described.

Eyes smaller than in *Sol. siphonocera*, globular, black, basal joint with a hairy squamiform tooth.

Antennular peduncle 10,5 mm. long, almost half as long as the carapace, rostrum included; prosarthema not longer than the eyes, stylocerite as long as them, and there is a small spine at the far end of the outer margin of the 1st joint, 2nd joint twice as long as the 3rd. Antennular flagella of equal length, the upper (outer) one 23,5 mm. long, as long as the carapace, rostrum included; of the two flagella, that are both abruptly acuminate, the lower (inner) one that slightly narrows distally, is distinctly broader than the other, that shows along its whole length the same width of 0,7 mm.; the lower flagellum, however, 1,2 mm. broad proximally, is 0,7 mm. broad at the distance of 1 mm. from the extremity. As in the other species of this genus both flagella are compressed, the lower being slightly convex externally, concave internally, whereas the upper is more flattened[1]).

Antennal peduncle reaching to the apex of 1st antennular article; the basal joint carries a small spine, directed horizontally forward, at its outer angle, the scaphocerite resembles that of *Sol. siphonocera* and is as much longer than the antennular peduncle as measures the terminal joint of the latter.

The sternal ridges between the four first pairs of pleopods carry each a sharp conical spine in the middle.

Penaeopsis A. M.-Edw.

(*Metapenaeus* W.-Mas., 1891; *Archipenaeopsis* Bouv., 1905; *Metapenaeopsis* Bouv., 1905).

The genus *Penaeopsis*, established by A. Milne-Edwards in 1881, at present comprises nearly 50 species, the 6 new species of the "Siboga" included. Except three or four, that are inhabitants of the Atlantic, all these species are found in the Indopacific. *Penaeopsis serratus* A. M.-Edw., the species on which this genus was established, occurs not only in the Caribbean Sea and in the Gulf of Mexico, but is also known from the west coast of Africa, North of the Equator; a variety, *antillensis* Bouv., occurs in the seas of the Antilles. *Pen. megalops*

1) In the older descriptions of the mediterranean *Sol. siphonocera*, as e. g. in those of H. Milne-Edwards, Heller and even in that of Gourret (1888), the upper flagellum is described as cylindrical or setiform: this is not right, the upper flagellum, indeed, is as much compressed as the other, not at all cylindrical, but it is much narrower.

(S. I. Smith) from the Caribbean Sea is regarded by Professor BOUVIER as identical with *Pen. serratus*. *Pen. pubescens* (Stimpson) is known from St. Thomas and perhaps this species is identical with *Pen. pubescens* Bouv. from the East Atlantic. Very closely related to this species, if not identical, is *Pen. Goodei* (S. I. Smith), a form recorded not only from Bermuda, the coast off Florida, the island of Sombrero and the coast of Brazil, but also from the Bay of Panama. All the others are indopacific species. *Pen. monoceros* (Fabr.) and *Pen. Richtersii* (Miers) are perhaps the most widely ranging species. *Pen. monoceros*, indeed, occurs on the west and on the east coast of British India, in the Gulf of Bengal, at Hongkong, in the seas of Japan and it is known from several Stations in the East Indian Archipelago; this species has been recorded by HILGENDORF from Quellimane on the coast of Mozambique and by HASWELL from the Endeavour River, Queensland. *Pen. Richtersii* from the Western Indian Ocean is recorded by Miss RATHBUN from the Hawaiian Islands and has been captured by the "Siboga" off the island of Banda. *Pen. longipes* (Paulson), *Stebbingii* (Nob.) and *Vaillanti* (Nob.) are inhabitants of the Red Sea, while *Pen. cognatus* (Nob.) and *Pen. consobrinus* (Nob.) have still only been observed at Djibouti. *Pen. perlarum* (Nob.) is known from the Persian Gulf. *Pen. coniger* (W.-Mas.), *gallensis* (Pearson), *Deschampsii* (Nob.), *Dobsoni* (Miers) and *Lysianassa* (de Man) are found at different localities on the coasts of British India, Ceylon and the Gulf of Bengal. *Pen. affinis* (H. M.-Edw.), with which *Pen. mutatus* (Lanch.) from the Malay Peninsula is perhaps identical, ranges from the west coast of India (Karáchi) until to Japan and *Pen. mogiensis* Rathb. from Japan has also been observed in the Gulf of Bengal and off the Malabar coast. *Pen. avirostris* (Dana), *brevicornis* (H. M.-Edw.), *stridulans* (W.-Mas.) and *Pen. coniger*, var. *andamanensis* (W.-Mas.) are species observed both in the Gulf of Bengal and in the East Indian Archipelago. The largest number of species of this genus are at present known to occur in the East Indian Archipelago, for which knowledge we are greatly indebted to the investigations of the "Siboga"; these 18 species are the following:

SECTION I.	*affinis* (H. M.-Edw.).	*elegans* de Man.
	avirostris (Dana).	*incisipes* (Sp. Bate).
	brevicornis (H. M.-Edw.).	*monoceros* (Fabr.).
SECTION II.	*Borradailei* de Man.	*philippinensis* (Sp. Bate) [1]).
	coniger (W.-Mas.), var. *andamanensis* (W.-Mas.).	*quinquedentatus* de Man.
	distinctus de Man.	*Richtersii* (Miers).
	Evermanni (Rathb.).	*Challengeri* de Man, n. nom.
	gracilis (Dana).	*Sibogae* de Man.
	hilarulus de Man.	*stridulans* (W.-Mas.).

With regard to these species we must still consider that *Pen. Evermanni* was first recorded from the Hawaiian Islands, while *Pen. Challengeri* has previously been observed by the "Challenger" in Torres Strait and at the Fiji Islands, for this species is the same as that which was described by SPENCE BATE under the name of *Penaeus serratus*.

1) This species seems to be identical with *Pen. Philippii* Sp. Bate 1881 from the Philippine Islands.

Pen. Joyneri (Miers) of the first Section of this genus and *Pen. acclivis* (Rathb.), *barbatus* (de Haan) = *akayebi* (Rathb.), *Dalei* (Rathb.), *ensis* (de Haan), *intermedius* (Kish.) and *lamellatus* (de Haan), which belong to the second, are species inhabiting the seas of Japan and not yet recorded from elsewhere except *Pen. acclivis* and *Pen. Dalei*, which, according to PEARSON, should also occur in the Gulf of Manár and at Trincomalee. *Pen. Batei* (Miers) is still only known from Albany Island near Cape York; it must probably be added to the Fauna of the East Indian Archipelago. *Pen. Mastersii* (Hasw.), *Macleayi* (Hasw.) and *Palmensis* (Hasw.) are inhabitants of the east coast of Australia and *Pen. villosus* (Guérin) is also from New Holland. With certainty *Pen. velutinus* (Dana) is still only known from the Hawaiian Islands and *Pen. commensalis* (Borr.) from the island of Rotuma; *Pen. Kishinouyei* (Rathb.), finally, inhabits the sea off the Galapagos Islands and ought perhaps to be included in the american Fauna.

The great majority of the species of this genus are sublittoral and inhabitants of rather shallow water, a few, however, are recorded from greater depths. So e.g. *Pen. Sibogae*, captured by the "Siboga" at a depth of 247 m. and 274 m., *Pen. philippinensis* from depths of 82, 100, 140 and 150 fathoms and *Pen. Challengeri*, collected by the "Challenger" at depths of 315 and 1400 fathoms and a specimen of which was taken by the "Siboga" in water of 304 m. *Penaeopsis serratus* A. M.-Edw., finally, was found in water of 148 and 288 fathoms in the Caribbean Sea and the Gulf of Mexico, and between 120 and 640 m. by the "Talisman".

SECTION I. No marginal subterminal articulating spines on the telson. Last pair of thoracic legs without exopod; their merus, in the adult male, with a notch and spine or tooth at its proximal end.

* † 18. *Penaeopsis monoceros* (Fabr.).

Metapeneus monoceros (Fabricius), A. Alcock, Catal. Indian Decapod Crustacea, Pt. III, Fasc. I. The Prawns of the *Peneus* group, Calcutta, 1906, p. 18, Pl. III, Fig. 7, 7*a*—*c* (ubi synon.).
Penaeus incisipes K. Kishinouye, Journ. Fish. Bureau, Tokyo, Vol. VIII, N° 1, 1900, p. 18, Pl. IV, Fig. 2 and Pl. VII, Fig. 6.

Stat. 2. March 8. 7° 25′ S., 113° 16′ E. Madura-strait. 56 m. Grey mud with some radiolariae. 1 adult female.
Stat. 47. April 8/12. Bay of Bima; near south fort. 55 m. Mud with patches of fine coral sand. 1 female of medium size and 6 still younger males, in 3 of which, however, the petasma is already developed.
Stat. 71. May 10—June 7. Makassar and surroundings. Depth up to 32 m. Mud. Sand with mud. Coral. 1 male and 4 females of medium size and 3 very young specimens.
Stat. 311. February 12/13. Sapeh-bay, East coast of Sumbawa. Depth up to 36 m. Mud and sand. 1 female of medium size.
Stat. 318. February 22. 6° 36′.5 S., 114° 55′.5 E. Java Sea. 88 m. Fine, yellowish grey mud. 1 young male.

These specimens certainly belong to that species which has been described by KISHINOUYE as *Pen. incisipes* and very probably also to the species described by ALCOCK as *Metap. monoceros*, though I must observe that the petasma in the three specimens, in which it is

developed, presents a somewhat other form than in the fig. 7*b* of Professor ALCOCK's quoted paper. These three males from Stat. 47 are 85—90 mm. long. Their petasma, as is obvious by comparing the figure, pretty well agrees with that published by the japanese author, (l.c. Pl. VII, Fig. 6), while the petasma presents a different form, as figured by ALCOCK. I suppose, however, this difference may prove to be due to the young age of our specimens. For the rest they fully agree with the detailed description given by that author.

The adult female from Stat. 2 is 150 mm. long. The rostrum that reaches almost to the tip of the antennular peduncle and that is directed somewhat obliquely upward, is armed with 9 teeth, of which the 1st or epigastric tooth is more than twice as far distant from the 2nd as the 2nd from the 3rd, which is situated above the orbital margin. Post-rostral crest continued to the posterior margin of the carapace. Tomentum of carapace and abdomen well developed, except on the smooth ridges etc. First to third abdominal somites bluntly carinate, the following sharply. Sixth somite twice as long as the fifth, measured along the upper margin; telson longer than sixth somite, barely shorter than the inner uropod.

The outer antennular flagellum, 1 mm. longer than the inner, measures 15,5 mm., i. e. two-thirds the length (22 mm.) of the peduncle; it is one and a half as long as the two last joints of the peduncle taken together. Antennal flagellum 300 mm. long, twice as long as the body.

The external maxillipeds reach to the end of the antennal peduncle.

The three anterior pereiopods carry a strong spine at the base and one observes moreover a small acute tooth at the distal extremity of the ischium of the 1st pair; this tooth, described by KISHINOUYE, was not observed by ALCOCK. The 1st pair of legs reach to the end of the antennal peduncle, those of the 3rd extend with the fingers beyond the apex of the scales, but those of the 5th pair do not yet quite reach it.

Thelycum fully developed, the prominent and upstanding margins of the ear-like lobes are conspicuously curved inward.

The rostrum of the male specimens from Stat. 47 just reaches beyond the distal end of the 2nd antennular article and carries 8 or 9 teeth besides the epigastric tooth; the post-rostral carina already reaches to the posterior edge of the carapace and the blunt carinae on the 1st—3rd somites are already traceable. The outer antennular flagellum measures two-thirds the peduncle as in the adult. In one male, 90 mm. long, the 5th legs project with half the dactyli beyond the apex of the scales, in another they reach as far as the terminal spine; the subterminal lobule on the posterior margin of the ischium is distinctly developed, like also the retrorse and introrse spine in front of the notch at the posterior end of the merus and the 10—12 fine denticulations in front of the tooth are quite conspicuous; they reach beyond the middle of the merus.

The female is 105 mm. long, the rostrum, just reaching beyond the 2nd antennular article, is 9 + 1 dentate and the post-rostral crest reaches almost to the hinder edge of the carapace. The 1st—3rd abdominal somites are, however, still smooth and rounded, presenting no trace at all of the blunt carinae. The outer flagellum (10 mm.) measures not yet two-thirds the length (16,5 mm.) of the antennular peduncle. The lateral margins of the thelycum are not yet upstanding and curved inward, different from the adult female from Stat. 2.

The male from Makassar is 90 mm. long. Post-rostral crest continued almost to the posterior margin of the carapace and the blunt carinae on the 1st to 3rd abdominal somites are already traceable. The two branches of the petasma are not yet united and, conform to this immature state, the notch and the tooth on the merus of the 5th pair are still rudimentary, while the fine denticulations on this joint and the subterminal lobule of the ischium are still wanting.

The female from the east coast of Sumbawa is 115 mm. long and already completely agrees with the adult specimen from Stat. 2. I will only remark that the telson just reaches beyond the tip of the inner uropod. The antennal flagellum, 285 mm. long, measures 2,5-times the length of the body.

The male from Stat. 318 is young, 75 mm. long. The rostrum, more strongly directed upward than in the other specimens, is 11 + 1 dentate and reaches to the end of the antennular peduncle. Post-rostral crest quite obvious, as also the carinae on the 1st—3th abdominal terga. Tomentum more conspicuous than in other specimens of the same size. Branches of petasma not yet united. The 5th legs reach almost with their dactyli beyond the tip of the scales; there is a trace of the notch at the proximal end of the merus, but the tooth, the denticulations and the lobule of the ischium are fully wanting. Antennular flagella as in the preceding specimens. Telson much shorter than the inner uropod. Perhaps a local variety.

Remarks. The type specimens of SPENCE BATE's *Pen. incisipes* do not more exist in the British Museum, but Fig. 2 of Plate XXXIV of the Challenger Report evidently refers to this species, the 5th legs presenting all the distinctive features of it. As regards, however, the figures 2″ (Petasma) and 2‴ (Thelycum) I don't venture to give any opinion; they are perhaps inaccurate.

General distribution: Along the coasts of India from the Indus Delta to Hongkong (ALCOCK); East Indian Archipelago (Atjeh; Makassar; fresh-water of the river at Maros; Pare-Pare; brackisch water of the river Tjenrana at Palima, Celebes) (DE MAN); Philippine Islands (SPENCE BATE) and at the coasts of Japan (KISHINOUYE).

HASWELL records this species from the Endeavour River, Queensland, and, according to HILGENDORF, it should also occur at Quellimane.

† 19. *Penaeopsis affinis* (H. M.-Edw.).

Metapeneus affinis A. Alcock, Catal. Indian Decapod Crust. Part III, Macrura. Fasc. I, The Prawns of the *Peneus* group. Calcutta, 1906, p. 20, Pl. III, Fig. 8, 8*a*—*b* (ubi synon.).
Penaeus affinis K. Kishinouye, in: Journal Fisheries Bureau, Vol. VIII, N° 1, Tokyo, 1900, p. 16, Pl. IV, Fig. 1, Pl. VII, Fig. 5.

Stat. 4. March 9. 7°42′ S., 114°12′.6 E. Anchorage off Djangkar (Java). 9 m. Coarse sand. 1 very young specimen, 28 mm. long, probably belonging to this species.
Stat. 19. March 19/21. 8°44′.5 S., 116°2′.5 E. Bay of Labuan Tring, west coast of Lombok. 18—27 m. River-mud, coral, coralsand. 1 young female and 1 still younger male.
Stat. 47. April 8/12. Bay of Bima, near south fort. 55 m. Mud with patches of fine coral sand. 3 very young males and 3 females of the same size.
Stat. 213. September 26—October 26. Saleyer-anchorage and Surroundings. Reef. 1 young male and 2 young females.

When describing *Pen. monoceros*, I have pointed out (p. 55) that the petasma was not

precisely shaped as in ALCOCK's figure, while it did perfectly well resemble the figure in the paper of KISHINOUYE, and I supposed this difference to be due to the young age of the specimens that were collected. The same fact is shown by the petasma of the present species: it perfectly well agrees with the Fig. 5 in KISHINOUYE's paper, as it terminates in a cross piece (SPENCE BATE, in: Ann. Mag. Nat. Hist. Sept. 1881, p. 179), and it therefore shows another form as in Fig. 8*a* of Professor ALCOCK's Monograph. This different appearance, in my opinion, is similarly due to the young age of these specimens.

The male from Stat. 213 is 63 mm. long. The rostrum, which is slightly directed upward, is 9 + 1 dentate and resembles Fig. 8*d* of ALCOCK's paper; it just extends beyond the tip of 2nd antennular article. External maxillipeds projecting as far forward as the antennal peduncle. The legs of the 1st pair reach to the base of the terminal joint of the antennal peduncle, while those of the 3rd pair extend to the middle of 2nd antennular article; the 4th legs are but a little shorter than the antennal peduncle, while those of the 5th reach to the distal 5th part of the antennal scales. Three anterior pereiopods with a strong spine at base. In the merus of the 5th legs the notch and the twisted tooth near the proximal extremity are already conspicuous. The form of the petasma will be best understood by the figure. The tubercle on the outer margin of the basal article of the uropods and the emargination on the external margin of the outer uropod are already well developed. The three males from Stat. 47, that are hardly 60 mm. long and the young male from Stat. 19 agree with the described specimen.

The female from Stat. 19 measures 77 mm. The rostrum, 9 + 1 dentate, is as long as the antennular peduncle and distinctly curved upward. The post-rostral carina, though low and blunt, is traceable to near the hinder edge of the carapace. As regards the relative length of the pereiopods this female resembles the male described above. The thelycum agrees with KISHINOUYE's Fig. 5 A on Plate VII.

The other females are of the same size or younger.

General distribution: *Penaeopsis affinis* has been recorded by Col. ALCOCK from various localities on the coast of India (Orissa coast, Ganjam coast, Madras, Colombo and Karáchi), while, according to KISHINOUYE, this species is rather widely distributed from the Tokyo Bay to Formosa, but he adds that, as its distribution is restricted to very shallow parts only, the catch of this species is not abundant. Singapore (NOBILI).

† 20. *Penaeopsis elegans* (de Man).

Metapeneus elegans J. G. de Man, in: Notes from the Leyden Museum, Vol. XXIX, 1907, p. 130.

Stat. 121. July 14/16. Menado-anchorage. 55 m. 2 males.

This species, belonging to that section of the genus in which the telson carries no lateral marginal spinules, most closely resembles *Pen. affinis* (H. M.-Edw.); it is described as a new species, because the petasma has a different form and because the legs of the 5th pair are shorter — with some doubt, however, for the two specimens are probably not yet full-grown.

The two males are 81 and 75 mm. long. The slender rostrum that in both specimens

reaches the end of the antennular peduncle, appears at first obliquely ascending, whereas the distal half, beyond the 1st antennular article, is curved upward. In both specimens the toothing-formula is 1 + 10; the epigastric tooth, much smaller than the following, is situated immediately behind the anterior fourth of the carapace and the following teeth slightly decrease in size towards the tip. The carapace and the abdomen are smooth and shining, the shallow depressions and grooves on the 6th abdominal somite and on the telson being the only parts that are tomentose. The low and obtuse, post-rostral crest is somewhat flattened immediately behind the epigastric tooth, but fades away before reaching the posterior margin of the carapace. Post-ocular tooth small, but sharp. Post-antennular spine strong, produced backward as a salient ridge, the post-antennular groove therefore well-marked; hepatic spine of the same size as the post-antennular, the other grooves as in *Pen. monoceros*.

The 1st—3rd abdominal somites are rounded above, without any trace of carination; the 4th—6th are carinate, the 5th and 6th rather sharply, while the carina of the 4th takes its origin at the anterior third of this somite. The 5th somite is little more than half as long as the 6th, and the 6th is barely shorter than the telson.

Eyes reaching to the middle of the rostrum.

Antennular peduncle a little shorter than the scaphocerite. The outer (upper) flagellum, that is slightly longer than the other, is but little shorter than the distance between the anterior margin of the carapace and the distal extremity of the antennular peduncle: in the larger specimen this distance measures 12,5 mm., while the outer flagellum is 11,5 mm. long. The antennal flagellum is about 2,5-times as long as the body.

The external maxillipeds extend to the middle of the terminal joint of the antennal peduncle.

The three chelate legs are armed each with a slender spine at the base, a much smaller spine occurs also at the far end of the ischium of the 1st legs; the basal spines are of equal length. The 1st pair reaches to the base of the terminal joint of the antennal peduncle, the legs of the 3rd pair reach to the 3rd joint of the antennular peduncle, those of the 4th project almost as far forward as the legs of the 1st and the pereiopods of the 5th pair, finally, reach to the middle of the antennal scales and are therefore shorter than in *Pen. affinis*. In *Pen. monoceros* (Fabr.) the lower margin of the ischium of the 5th legs carries a subterminal, triangular and subacute lobule (Alcock, l. c. 1906, fig. 7); in *Pen. elegans*, however, the lower margin is expanded, slightly arcuate, sharp, though entire, but presenting no lobule. The notch at the proximal end of the merus is bounded anteriorly by a rather short, retrorse tooth, that is not curved inward as in *Pen. monoceros* or *incisipes*, but directed outward; this tooth also is not sharp, but obliquely truncate posteriorly. Beyond this tooth the edge of the merus appears entire, without a trace of the denticles found in *Pen. monoceros* (Fabr.). The 5th legs carry no exopod.

The petasma will be best recognized from the figures: it terminates in the larger specimen distally in two small anterior and two large posterior lobes, the latter are obliquely furrowed on their posterior surface. In the younger male the posterior lobes show a somewhat other form, each being cut into two lobules.

As well in *Pen. affinis* (H. M.-Edw.) as in *Pen. mutatus* Lanch. (Proc. Zool. Soc. London, 1901, Pl. XXXIV, Fig. 6*b*, 6*c*) the petasma has a different form, I wish, however, to remark that the petasma of *Pen. monoceros*, as it is figured by Alcock (l. c. 1906, Pl. III, fig. 7*b*), closely resembles that of *Pen. elegans*, but in *Pen. monoceros* the distal posterior lobes are separated from one another by a much larger interspace.

†21. *Penaeopsis* sp.

Stat. 71. May 10—June 7. Makassar. Depth up to 32 m. Mud. Sand with mud. Coral.
1 female.

I do not succeed in identifying with certainty this specimen, perhaps it may prove to belong to *Pen. avirostris* (Dana), a species regarded by Col. Alcock as identical with *Pen. brevicornis* (H. M.-Edw.) (Alcock, Catal. Indian Decap. Crust. Part III. Macrura. Fasc. I, Calcutta, 1906, p. 22), whereas, according to Nobili, who had the occasion to study six adult specimens from Buntal, on the west coast of Borneo, *Pen. avirostris* should be a distinct species (Boll. Mus. Torino, N° 447, Vol. XVIII, 1903, p. 2).

The female from Makassar is 65 mm. long and probably young. The rostrum that reaches to just midway between the end of the antennal scales and that of the antennular peduncle, closely resembles the rostrum of *Pen. avirostris* (Dana, Pl. 40, Fig. 3), the proximal crest, however, is a little less elevated and it bears eight teeth, instead of six. Three teeth are on the carapace, the 1st or epigastric tooth and the smallest of all is almost twice as far distant from the 2nd as the 2nd from the 3rd; the 2nd and following teeth are equidistant; the last tooth is situated at the distal end of the eyes, on the middle of the free part of the rostrum and the slender, styliform, distal part is slightly turned upward. The faint post-rostral ridge disappears not far from the posterior margin of the carapace.

Carapace and abdomen are smooth, but the tomentum is probably worn off, for it is still present in front of the hepatic spine. Orbital tooth small, acute. Antennal spine and hepatic spine of usual size. Gastro-frontal groove distinct and rather deep; post-antennular groove shallow, anterior part of the cervical groove arcuate and meeting the quite distinct sulcus gastro-hepaticus. As in *Pen. monoceros*, the posterior branchial region is defined superiorly by an oblique ridge, which does not reach to the hepatic spine. Antero-inferior angle of the carapace rounded. The 1st—3rd abdominal somites are rounded, the 4th quite inconspicuously carinate on its posterior half; the 6th somite is a little more than twice as long as the 5th. The telson is a trifle shorter than the 6th somite and considerably shorter than the inner uropod; longitudinal groove deep, lateral margins unarmed.

The antennular flagella are not complete, they are probably somewhat longer than the two last joints of the peduncle.

The external maxillipeds hardly reach beyond the end of the antennal peduncle. The three anterior legs are unispinose at base, those of the 1st pair reach to the middle of the antennal peduncle, those of the 3rd almost to the end of the antennal scales, those of the 5th are short, just extending beyond the end of the antennal peduncles. The coxae of the 4th

pair bear an acute, tooth-like process internally. Last pair of thoracic legs without an exopod.

The anterior median plate of the thelycum is rounded anteriorly and distinctly grooved longitudinally; the two lateral plates are quite posteriorly united with one another, being separated for the rest by a Y-like interspace, the antero-external angles of which are rounded and brown coloured.

Section II. Apex of telson with 3 or 4 pairs of lateral marginal spines.

22. *Penaeopsis coniger* (W.-Mas.), var. *andamanensis* (W.-Mas.).

Metapenaeus philippinensis, var. *andamanensis* J. Wood-Mason, in: Ann. Mag. Nat. Hist. (6) VIII, 1891, p. 271.
Peneus (Metapeneus) coniger, var. *andamanensis* A. Alcock, Descr. Catal. Indian Deep-Sea Crustacea, 1901, p. 17.
Metapeneus coniger, var. *andamanensis* A. Alcock, Catal. Indian Decap. Crust. Part III. Macrura. Fasc. I, Calcutta, 1906, p. 27, Pl. IV, Fig. 13.

Stat. 12. March 14. 7° 15′ S., 115° 15′.6 E. Bali Sea. 289 m. Mud and broken shells. 2 young females.
Stat. 15. March 15. 7° 2′.6 S., 115° 23′.6 E. Bali Sea. 100 m. Fine coralsand. 5 young males and 6 young females.
Stat. 51. April 19. Madura-bay and other localities in the southern part of Molo-strait. From 54—90 m. Fine grey sand; coarse sand with shells and stones. 4 very young specimens.
Stat. 254. December 10. 5° 40′ S., 132° 26′ E. Near Kei-islands. 310 m. Fine, grey mud. 3 adult males.
Stat. 302. February 2. 10° 27′.9 S., 123° 28′.7 E. Between Rotti and Timor. 216 m. Sand and coral sand. 2 young females.

While the three adult males from Stat. 254 certainly belong to the var. *andamanensis* of *Pen. coniger*, it is with a more or less great uncertainty that the other specimens are also referred to it. Unfortunately the thelycum of the typical *coniger* has not been figured; it is moreover still unknown whether the characters of the adult individuals exist also already in the young, whether e. g. the thelycum shows the same form, the petasma the same length in proportion to the length of the carapace etc.

The three adult males from Stat. 254 are nearly of the same size; in the largest specimen the carapace (rostrum included) is 35 mm. long, the abdomen 74 mm., the total length 109 mm.; in the two other specimens these numbers are, in the same succession, 32 mm., 67 mm., 99 mm. and 31,5 mm., 63,5 mm., 95 mm. The rostrum reaches the end of the antennular peduncle or to the middle of the 3rd article; it bears 6 teeth in addition to the epigastric tooth which is very small and smaller than the teeth of the rostrum proper. The inner antennular flagellum is a trifle longer than the peduncle, in the two smaller males it is just as long as the latter; the distance between the conical denticle and the base of the flagellum measures little more than one-sixth its length.

The subcarinae of the 4th—6th abdominal terga are quite indistinct.

The external maxillipeds reach almost to the apex of the antennal scales. In the three specimens there is a small spine at the base of the 2nd pair of thoracic legs, this spine has not been described by ALCOCK. The legs of the last pair extend just beyond the middle of the antennal scales.

The carapace of the largest male is 18 mm. long, without the rostrum, measured near the dorsal median line; the petasma, 10 mm. long, is a little more than half as long as the carapace. This length was indicated by ALCOCK (l. c. 1901, p. 17) as characteristic of the variety, for in the typical species the petasma should be about a third as long as the carapace (without the rostrum).

The 11 specimens from Stat. 15 are all very young and nearly of the same size. The largest male is 53 mm. long, the carapace, rostrum included, measuring 15,5 mm., and without the rostrum 9 mm. The straight rostrum that is slightly directed upward and armed with 6 teeth in addition to the epigastric tooth, reaches almost to the far end of the 2nd antennular article; the conical denticle on the longer flagellum is well developed. One observes at either side of the median carina of the 4th abdominal tergum a subcarina that takes its origin about at one-third the length of the somite from its anterior margin and that reaches until near the posterior margin; the anterior third part of this tergum is smooth, glabrous and shining, but the rest of the somite is tomentose. The subcarinae of the 6th somite are also well marked, but those of the 5th are indistinct. The petasma is already 4 mm. long and it is therefore that I refer this male to the var. *andamanensis*, because I suppose that the described subcarinae of the 4th and 6th terga will disappear at a more advanced age. Another specimen fully agrees with the described one, but the conical tubercle of the longer flagellum seems to be wanting in the three other males; they are, however, referred to the same variety, because they agree in all other characters. The females fully resemble the males, the subcarinae of the 4th tergum are distinct, and not only the subcarinae of the 5th, but also those of the 6th somite are wanting. The thelycum resembles ALCOCK's figure 13 (l. c. 1906), but the posterior end of the median part shows but a very small incision. The two females from Stat. 302 agree with the described ones.

The two females from Stat. 12 are little larger than the preceding; one has lost the rostrum, in the other it is 5 + 1 dentate, the foremost tooth, very small, is situated close to the tip but far from the penultimate, so that evidently some teeth are not developed. The subcarinae of the 4th tergum are as in the preceding specimens from Stat. 15, those of the 5th are rather indistinct, but on the 6th they are well marked. The thelycum has, however, a somewhat different form, the median part being square-cut, without posterior incision; the lateral incisions, characteristic of the thelycum of *Pen. philippinensis* (Challenger Macrura, Pl. XXXV, Fig. 2″) are, however, also wanting.

It remained doubtful whether the 4 very young specimens from Stat. 51 also belong to this species or not.

All the thoracic legs bear an exopod.

General distribution: East of North Andaman Island; off Port Blair, Andamans; off Cape Comorin, and in the Andaman Sea (ALCOCK).

†23. *Penaeopsis Sibogae* (de Man).

Metapeneus sibogae J. G. de Man, in: Notes from the Leyden Museum, Vol. XXIX, 1907, p. 131.

Stat. 306. February 8. 8° 27′ S., 122° 54′.5 E. Lobetobi Strait. 247 m. Sandy mud. 11 males and 9 females.

Stat. 312. February 14. 8° 19′ S., 117° 41′ E. Saleh-bay, North coast of Sumbawa. 274 m. Fine, sandy mud. 1 female.

A new species closely related to *Pen. coniger* (W.-Mas.), to the variety *andamanensis* (W.-Mas.) and to *Pen. philippinensis* (Sp. Bate).

The numerous specimens are nearly all of the same size, the males attain a length of 70 mm., the females grow 80 mm. long. Body tomentose. The rostrum that has a more slender form than in the quoted species, is, in the male, a little longer than the rest of the carapace and usually reaches just beyond the tip of the antennal scales for a very short distance; rarely it reaches only as far as that tip. The rostrum, rarely quite straight, has usually the distal half or third part more or less curved upward. In the female the rostrum is longer and about one and a half as long as the rest of the carapace; usually it reaches with one-third or one-fourth of its length beyond the tip of the antennal scales, rarely it extends only just beyond it. In addition to a small, epigastric tooth, situated at the anterior fourth of the carapace or just behind it, the rostrum is armed with 8 or 9 small teeth, that are all situated on the rostrum itself; these teeth become smaller and further apart according as they approach the extremity, but the very small, foremost tooth is often situated closer to the preceding tooth than the latter to the antepenultimate. The lower margin is fringed with long hairs to beyond the middle. No post-rostral ridge behind the gastric region. There is a distinct post-ocular angulation, but hardly a tooth. Post-antennular (antennal) spine moderate, not continued backward as a distinct ridge, post-antennular groove therefore quite shallow. Branchiostegal spine small, as in *Pen. coniger*. Hepatic spine a little smaller and situated somewhat lower than the antennal spine. Grooves of the carapace as feeble as in *Pen. coniger* var. *andamanensis*.

As regards the shape, the carination and other characters of the abdomen this species fully agrees with the var. *andamanensis*; as in this variety there are obscure traces of sub-carinae on the 4th and 6th terga. The 6th abdominal somite is twice as long as the 5th, a trifle longer than the telson and a little shorter than the carapace, without the rostrum; the telson, as regards its form and toothing, also resembles *Pen. coniger* var. *andamanensis*.

Eyes large. Antennular peduncle a little longer than the carapace without the rostrum, and measured near the dorsal median line; the very slender and acuminate stylocerite is regularly curved upward and just as long as the eyes; the 2nd article, shorter than the 1st, is twice as long as the 3rd. The inner (lower) flagellum is, in the male, one and a half as long as the peduncle, i. e. the distance between the frontal margin of the carapace and the tip of the peduncle; in the female this flagellum appears almost as long, i. e. very little longer than the peduncle. The upper flagellum appears in the male one-fourth shorter than the other, and it is but little longer than the peduncle, its widened proximal portion is slightly shorter than the rest; the shorter flagellum of the female shows the same length as in the male, but the proximal widened portion is much longer, 3-times as long as the filiform distal part. As in *Pen. coniger*

the longer flagellum of the male bears, at one-sixth of its length from the base, a small tooth, the acute tip of which is curved backward; the flagellum is here a little broadened and between the tooth and the peduncle, it is slightly concave; in the female this tooth is wanting.

The narrow antennal scales are, in the male, nearly as long as the antennular peduncle, but in the female a little longer than it; the flagellum is, in the male, about one and a half as long as the body.

The external maxillipeds reach, in the male, to the distal third or fourth of the scales, in the female to near the apex; they bear an antrorse spine at base.

Both in the male and in the female the 1st pair of legs are bispinose, the 2nd unispinose, the following unarmed; the spine at the base of the 2nd legs is smaller than those of the 1st pair. All the pereiopods show a somewhat more slender form than those of *Pen. coniger*, var. *andamanensis*; all are provided with an exopod. The legs of the 3rd pair reach with their chelae beyond the apex of the antennal scales, in the adult female even with one-fourth of the propodus, those of the 4th project almost with their dactyli beyond the eyes, those of the 5th reach almost to the far end of the 2nd antennular article.

The form of the petasma is different from that of *Pen. coniger*. The petasma is at least half as long as the carapace without the rostrum, measured near the dorsal median line and reaches to the base of the 2nd legs; it is asymmetrical, the right lobe always distinctly longer but narrower than the left, which distally is truncate; the right lobe is often somewhat turned outward.

The thelycum has also another form than that of *Pen. philippinensis* (Sp. Bate), *Pen. coniger* (W.-Mas.) and its variety. It consists of a quadrangular, white coloured, plate, is a little broader than long and longitudinally grooved in the middle of its posterior half; anteriorly this plate is truncate or slightly concave, whereas it ends posteriorly in two obtuse or rounded lobes. The slightly concave, lateral margins join the coxae of the 4th legs; immediately behind these coxae a salient lamina runs, at either side, from the lateral margins quite near the posterior end of the plate, obliquely backward, abutting near the coxae of the last pair of legs; the transverse, posterior margin of the sternum is thickened and between this margin and the plate there is a deep concavity. One observes a pair of flattened pointed teeth or spines between the bases of the 2nd legs of the female. This species attains perhaps a still larger size.

† 24. *Penaeopsis Richtersii* (Miers).

Penaeus Richtersii E. J. Miers, Report Voyage of H. M. S. "Alert", 1884, p. 564, Pl. LII, Fig. A.

Metapenaeus richtersii M. J. Rathbun, in: U. S. Fish Commission Bulletin for 1903, Part III, Wash. 1906, p. 904, Pl. XX, Fig. 2 and Fig. 57 (in the text).

Stat. 240. November 22 till December 1. Banda-anchorage. From 9—45 m. Black sand. Coral. Lithothamnion-bank in 18—36 m. 1 female.

This specimen, unfortunately bereft of the caudal fan and of the 6th and the 5th abdominal somites, certainly belongs to this species. The rostrum that reaches to the middle of the eye-peduncles, is armed with 5 teeth besides the epigastric tooth, the 2nd tooth is situated

just above the orbital margin; the epigastric tooth is as large as the 1st of the rostrum, the 2nd is a little larger, the following become gradually smaller. The upper margin of the foremost tooth is one and a half as long as that of the tip, so that, like in the specimens observed by Miss RATHBUN, the rostrum appears less acuminate than in MIERS' figure. Orbital tooth acute, well developed; antennal spine rather large, larger than the hepatic spine. Antero-inferior angle of the carapace rounded, without a trace of a branchiostegal spine.

Third antennular article half as long as the 2nd, appearing distinctly longer than in Fig. *a* of MIERS' paper; in this figure a small spine directed forward and outward at the end of the outer margin of 1st antennular article is also not indicated and the eye-peduncles appear in it too narrow. Antennular flagella tapering, equal, half as long as the carapace, rostrum excluded; the four flagella are curved upward near their base, but this may be accidental.

External maxillipeds hardly reaching to the end of the carpocerite.

First legs bispinose, the spine on the ischium minute, only perceptible by a strong lens; these legs extend to the base of the antennal peduncle, chela as long as the merus, a little longer than the carpus, fingers twice as long as the palm. The 3rd legs extend to the middle of the scaphocerite, the 4th are as long as the 1st and the 5th legs project to the end of the antennal peduncle. The measurements of the 5th legs, the joints of which are fringed with rather long hairs except the dactylus that carries 5 or 6 pairs of tufts of short setae, are the following: merus 2,55 mm. long, 4-times as long as wide; carpus 2,2 mm., propodus 1,3 mm. long and 3-times as long as broad at its base; dactylus 1,2 mm. long, triangular, 4-times as long as wide at its base. All the legs bear an exopod.

The thelycum agrees with the figure in Miss RATHBUN's paper. It bears anteriorly not only a median acute spine, situated between the bases of the 4th legs and visible in that figure, but the lateral ridges terminate also anteriorly in a small, acute spine, which was not figured by her.

This specimen has not yet attained its full size, the carapace, rostrum included, being 9,3 mm. long; according to Miss RATHBUN the carapace attains the length of 12,4 mm., and the total length should then be 42,8 mm.

General distribution: Western Indian Ocean, Cerf Island (MIERS); Hawaiian Islands (RATHBUN).

† 25. *Penaeopsis stridulans* (W.-Mas.).

Crotalocaris stridulans J. Wood-Mason, MS. name.
Metapeneus stridulans A. Alcock, Ann. Mag. Nat. Hist. (7) XVI, 1905, p. 526 and Catal. Indian Decap. Crust. Part III. Macrura. Fasc. I, Calcutta, 1906, p. 27, Pl. V, Fig. 14, 14*a—d*.
Peneus velutinus C. Spence Bate, Report Challenger Macrura, 1888, p. 253, Pl. XXXIII, Fig. 1.

Stat. 2. March 8. 7° 25′ S., 113° 16′ E. Madura-strait. 56 m. Grey mud with some radiolariae. 1 male and 2 females.
Stat. 19. March 19/21. 8° 44′.5 S., 116° 2′.5 E. Bay of Labuan Tring, West coast of Lombok. 18—27 m. River-mud, coral, coralsand. 1 male and 1 female.
Stat. 33. March 24/26. Bay of Pidjot, Lombok. 22 m. and less. Mud, coral and coralsand. 2 males and 1 female.

Stat. 47. April 8/12. Bay of Bima, near south fort. 55 m. Mud with patches of fine coral-sand. 1 very young female.
Stat. 53. April 21/22. Bay of Nangamessi, Sumba. Depth up to 36 m. Coral sand; near the shore mud. 1 male.
Stat. 64. May 4/5. Kambaragi-bay, Tanah Djampeah. Depth up to 32 m. Coral, coralsand. 3 males and 4 females, all young.
Stat. 162. August 18. Between Loslos and Broken-islands, West coast of Salawatti. 18 m. Coarse and fine sand with clay and shells. 1 very young male and 2 females, one of which is as young as the male, the other of medium size.
Stat. 163. August 18/20. Anchorage near Seget, West-entrance Selee (Galewo-)strait. 31 m. Sand and stone, mixed with mud. 1 young male.
Stat. 164. August 20. 1°42'.5 S., 130°47'.5 E. Between Misool and New Guinea. 32 m. Sand, small stones and shells. 1 young female.
Stat. 179. September 2/3. Kawa-bay, West coast of Ceram. 36 m. Stony bottom. 1 male.
Stat. 205. September 20. Lohio-bay, Buton-strait. 22 m. Sandy mud. 1 young female.
Stat. 213. September 26—October 26. Saleyer-anchorage. Reef. 1 male.
Stat. 258. December 12/16. Tual-anchorage, Kei-islands. 22 m. Lithothamnion, sand and coral. 2 very young males.
Stat. 273. December 23/26. Anchorage off Pulu Jedan, East coast of Aru-islands. (Pearl-banks). 13 m. Sand and shells. 2 males and 9 females, young or of medium size.
Stat. 285. January 18. 8°39'.1 S., 127°4.4 E. Anchorage South coast of Timor. 34 m. On the limit between mud and coral. Lithothamnion. 1 young male.
Stat. 296. January 24/26. 10°14' S., 124°5'.5 E. Anchorage off Noimini, South coast of Timor. 9—36 m. Sandy mud. 1 very young male and 1 nearly adult female.
Stat. 313. February 14/16. Anchorage East of Dangar Besar, Saleh-bay. Depth up to 36 m. Sand, coral and mud. 5 young males and 5 young females.
Stat. 320. February 23. 6°5' S., 114°7' E. Java Sea. 82 m. Fine, grey mud. 1 female.

The examination of these numerous specimens, though mostly young or of medium size, proved that *Penaeopsis stridulans* (W.-Mas.) is a very variable species. At first, indeed, these specimens did appear to me to belong to two different species, but the existence of several transitional forms led me to the conclusion that all ought to be referred to one and the same species. The variability bears upon the toothing of the rostrum, the more or less distinct development of the branchiostegal spine, the form of the stridulating-organ and the number of its ridges, the shape of the carina on the 3rd abdominal tergum, of the thelycum and of the thoracic legs, as also the length of the telson.

The female from Stat. 320 is adult, 88 mm. long. The rostrum, slightly curved upward on its distal half and reaching to the end of 2nd antennular article, is armed with 7 teeth in addition to the small, epigastric tooth. Branchiostegal spine smaller than in ALCOCK's figure 14 *b*. Stridulating-organ rather broad, consisting of 10 or 11 ridges. Branchial region defined, besides by a shallow groove below the hepatic spine, also by a sinuous furrow that from the hepatic spine runs nearly to the posterior border of the carapace. This sinuous furrow, that runs as in *Pen. coniger* (ALCOCK, l. c. Pl. IV, fig. 12), should not occur in the typical *Pen. stridulans*. The thelycum shows a different form from that of the typical *stridulans*, as figured by ALCOCK (l. c., fig. 14 *d*). The anterior plate between the legs of the 4th pair is longer in proportion to its width and appears therefore less transverse; the posterior transverse lamina is distinctly divided into three lobes; the transverse bar between both, finally, differs by the lateral walls that are longer, quite parallel with one another and making right angles with

the posterior margin. About as in *Pen. mogiensis* one observes a pair of obtuse sternal teeth between the legs of the 3rd pair.

The carina on the 3rd abdominal tergum is narrow and deeply grooved, while that of the 2nd is short, flattened, not grooved and reaching neither to the posterior nor to the anterior margin.

The external maxillipeds reach to the end of the antennal scales. The thoracic legs seem to agree with ALCOCK's fig. 14 (l. c.) and are all provided with an exopod.

The larger female from Stat. 2 has nearly the same size, viz. 84 mm., and fully agrees with the female from Stat. 320, except in the following. The rostrum bears 8 teeth besides the epigastric tooth. The sinuous groove between the hepatic spine and the posterior edge of the carapace is quite indistinct. Whereas the anterior plate of the thelycum has the same form as in the preceding female, the lateral walls of the transverse bar, though still long, are slightly diverging, and are no more exactly parallel; the transverse bar that unites them posteriorly, is not divided and emarginate as in the female from Stat. 320, the posterior transverse lamina, finally, is rather indistinctly divided into three lobes. In the male from Stat. 2, which is also adult and 92 mm. long, the rostrum shows the same toothing as the larger female and the sinuous groove between the hepatic spine and the posterior margin of the branchiostegite is wanting at all. The stridulating organ of the male consists of 11 ridges, that of the larger female of 12. In both the male and the larger female the legs of the 5th pair reach just beyond the eyes.

The somewhat younger female from Stat. 19 agrees with the larger female from Stat. 2, but the posterior transverse lamina of the thelycum is distinctly divided into three lobes; both in the female and in the male the rostrum is 1 + 7-toothed, and the groove between the hepatic spine and the posterior border of the branchiostegite is indistinct or wanting.

The specimens from Stat. 33 are of medium size or young and agree with those from Stat. 19, there is no trace of the sinuous groove between the hepatic spine and the hinder edge of the carapace.

In the largest female from Stat. 64, that is 70 mm. long, the lateral walls of the transverse bar in the middle of the thelycum are parallel as in the female from Stat. 320, but the transverse piece that unites them posteriorly, is entire as in the larger female from Stat. 2; the anterior margin of the anterior plate, between the legs of the 4th pair, is not concave, but slightly prominent in the middle. The rostrum of a younger male from the same locality is 1 + 9-toothed. The other younger females of this Station agree with the largest one, as regards the form of the thelycum, and in all these specimens there is no trace of the sinuous groove between the hepatic spine and the posterior margin of the carapace.

The female from the west coast of Salawatti differs from all the preceding and bears a close resemblance to *Pen. barbatus* (de Haan) = *akayebi* (Rathb.), as regards the shape of rostrum, carapace, stridulating organ and abdomen, except the 6th somite. The thelycum of this specimen which is 65 mm. long, indeed fully agrees with ALCOCK's fig. 14*d*, its form is quite different from that of the females that were captured in the preceding Stations. The sternal teeth between the pereiopods of the 3rd pair are separated by a much

broader interspace, like also the two spines between the legs of the 2nd. The rostrum that reaches to the end of the antennular peduncle, bears only 6 teeth in addition to the epigastric tooth, the branchiostegal spine appears as long as in ALCOCK's fig. 14*b* (l. c.) and there is no trace of the sinuous groove between the hepatic spine and the posterior border of the carapace. The arcuate stridulating organ runs closer to the lower margin of the carapace than in the typical species and is formed by 18 or 20 ridges that are shorter, finer and more closely situated near one another than in the preceding specimens. The carina on the 3rd abdominal tergum is broader, flattened above, not grooved at all, resembling that of *Pen. barbatus* (de Haan) = *akayebi* (Rathb.). The telson is a trifle shorter than the inner uropod. The external maxillipeds that do not yet reach to the apex of the antennal scales, are somewhat less slender. The carpus and the merus of the legs of the 1st pair are nearly of the same length, while in the preceding specimens the carpus is decidedly longer than the merus. Except as regards the broader and flattened carina on the 3rd abdominal tergum, this specimen evidently fully agrees with the description and the figures of the typical species. The two other specimens are very young and show the same characters.

The male from Stat. 163 is very young, but apparently agrees with that from the preceding Station; the young male from Stat. 179 shows again the characters of the specimens captured at Stat. 33, this is also the case with the female from Stat. 205.

The male from Saleyer is of medium size, 60 mm. long. It resembles the specimens from Stat. 33, but the rostrum, that just reaches beyond the 2nd antennular article, is 1 + 8-toothed.

The eleven specimens taken near the Jedan-Islands, apparently in the same haul, are of medium size or quite young. Eight of them show the same characters as the specimens from the west coast of Salawatti. The largest of these eight specimens is a female long 67 mm., that bears a Bopyrid in the right half of its carapace. The rostrum reaches to the end of the antennular peduncle and bears only 6 teeth besides the epigastric tooth. The other smaller specimens show also 6 or 5 teeth on the rostrum. One of the three remaining specimens is a female long 53 mm., in which the rostrum is 1 + 8-toothed. The anterior plate of the thelycum is less broad than in the other females from this Station, but the anterior margin is prominent in the middle like in the females from Stat. 64, and the transverse bar in the middle of the thelycum resembles that of the larger female from Stat. 2. The sinuous groove between the hepatic spine and the posterior margin of the branchiostegite is nearly indistinct. Another smaller female presents the same characters, but in the third somewhat larger specimen the anterior plate is still narrower, and the lateral walls of the transverse bar in the middle are very short, divergent.

The adult female from Stat. 296, 78 mm. long, almost accords, as regards the thelycum, with ALCOCK's fig. 14*d*, but the anterior plate is somewhat less broad. The rostrum is 1 + 7-toothed and reaches to the end of the antennular peduncle. Branchiostegal spine long. Sinuous groove between the hepatic spine and the posterior margin of the carapace hardly traceable. The groove on the carina of the 3rd abdominal tergum is shallow.

The ten specimens from Stat. 313 are quite young and present nothing noteworthy.

Remarks. *Penaeopsis stridulans* is most closely allied to a species that inhabits

the Inland Sea of Japan and that was described by me in 1907 under the name of *Penaeus (Metapenaeus) acclivis* Rathb. (in: Trans. Linn. Soc. 2nd Ser. Zoology. Vol. IX, Part 11, p. 434, Pl. 33, fig. 55). The female described in that paper is now lying before me. The thelycum (l. c. fig. 55) has a different form, owing to the large circular outgrowth on the coxae of the 4th pair of legs, these two processes being separated by a much narrower interspace than in *Pen. stridulans*. The legs of the 4th and of the 5th pairs are somewhat longer and more slender in *Pen. stridulans* than in *Pen. acclivis*: so e. g. the legs of the 5th pair reach in the adult female from Stat. 320 to the terminal fourth part of the antennal scales, but in the female of *Pen. acclivis* not beyond the two proximal fifth parts of their length. The ridges of the stridulating organ are shorter and situated closer to one another than those of *Pen. stridulans*.

Penaeopsis akayebi (Rathb.) differs both from *Pen. stridulans* and *Pen. acclivis* at first sight by the more elongate shape of the 6th abdominal somite. The two specimens from the Inland Sea of Japan, which I have described in the quoted paper (l. c. p. 433, Pl. 33, fig. 54), are lying before me.

Pen. velutinus (Dana) is also closely related. In this species, however, the telson is much shorter than the inner uropod, whereas in *Pen. stridulans* they are of the same length or nearly so; the 2nd pair of legs are in the Hawaiian species unarmed at base, and petasma and thelycum have a different form (Rathbun, in: U. S. Fish Commission Bull. for 1903, Part III, Wash. 1906, p. 903, Pl. XX, Fig. 5). Miss Rathbun is no doubt in the wrong, when referring fig. 1 of Plate XXXIII of the Report on the Challenger Macrura to Dana's species, as is already proved by the fact that she is inclined to exclude the figures of petasma and thelycum. The species which was figured by Spence Bate, seems to be in reality *Pen. stridulans*.

General distribution: Orissa coast, Andamans, Ganjam coast, Vizagapatam coast, Madras coast, Palk Strait, Gulf of Martaban, Hongkong, East Indian Archipelago (Alcock).

† 26. *Penaeopsis distinctus* (de Man).

Metapeneus distinctus J. G. de Man, in: Notes from the Leyden Museum, Vol. XXIX, 1907, p. 132.

Stat. 37. March 30/31. Sailus ketjil, Paternoster-islands. Close to reef. 27 m. and less. Coral and coralsand. 1 female.

Stat. 184. September 11/12. Anchorage off Kampong Kelang, South coast of Manipa-island. 36 m. Coral, sand. 2 females.

A species of the *Akayebi*-group, without stridulating organ, closely related to *Pen. mogiensis* (Rathb.), but distinguished, like from the other species of this group, by the form of the thelycum.

The two females from Stat. 184 are of equal size, 60 mm. long and somewhat larger than the female from Stat. 37. Rostrum and carapace closely resemble that of *Pen. mogiensis*; in both specimens the rostrum is 7 + 1-toothed, the epigastric tooth situated at the anterior fourth of the carapace, in both the ascending rostrum is straight above and below. It reaches just beyond the middle of 2nd antennular article. Supraorbital tooth, antennal spine and branchiostegal spine as in that species, which was described by Col. Alcock as *Metap. mogiensis*, but which

probably is not identical with the true *mogiensis* Rathb. (ALCOCK, Catal. Indian Decap. Crust., Macrura, 1906, p. 29, Pl. V, Fig. 15). Sixth abdominal somite measuring three-fifths the length of the carapace, without the rostrum, measured near the dorsal median line; it closely resembles that of *Pen. mogiensis* (Rathb.) (Proc. U. S. Nat. Mus. 1902, p. 40). The 6th abdominal somite is a trifle shorter than the telson, and the telson is a little shorter than the uropods.

The external maxillipeds reach to the end of the antennal scales, and the thoracic legs that are all furnished with an exopod, resemble those of ALCOCK's *Met. mogiensis*. Ventral spines between the bases of the feet of the 2nd pair well developed, like also the two small teeth between those of the 3rd.

The thelycum consists of the following parts: between the legs of the 5th pair two parallel transverse plates, the anterior of which is a little less broad but somewhat longer than the posterior; its anterior margin is emarginate, the outer angles are dentiform, the lateral margins arcuate. The posterior is cut into three lobes, the outer of which are bluntly dentiform and more prominent than that in the middle, the tip of which is mucronate. One observes between the 4th pair of legs a sunken plate a little less broad than long; the anterior border has dentiform angles and in the middle a mucronate tip. Midway between this anterior border and that of the anterior of the two plates lying between the legs of the 5th pair one observes a pair of small teeth that are smaller and of a different form than in ALCOCK's *mogiensis*, and between these teeth and the anterior of the two plates are situated a pair of acute dentiform tubercles that are a little farther distant from one another than the two anterior teeth which at their base are contiguous. These tubercles are wanting in the unnamed *Penaeopsis* that follows, and in most other species of the *Akayebi*-group.

The female from Stat. 37 is much younger, its rostrum that reaches to the middle of 2nd antennular article is 8 + 1-toothed.

All the thoracic legs bear an exopod.

† 27. *Penaeopsis* sp.

? *Metapenaeus mogiensis* A. Alcock, Catal. Indian Decap. Crust., Part III, Macrura, Fasc. 1, Calcutta, 1906, p. 29, Pl. V, Fig. 15, 15*a*, *b*.

Nec: *Parapenaeus mogiensis* M. J. Rathbun, in: Proc. U. S. Nat. Mus. Vol. XXVI, 1902, p. 39.

Stat. 104. July 2/3. Sulu-harbour, Sulu-island. 14 m. Sand. 1 very young female.

Stat. 152. August 12/13. Wunoh-bay, N.W. coast of Waigeu-island. 32 m. Lithothamnion-bottom. 1 young male.

Stat. 179. September 2/3. Kawa-bay, West coast of Ceram. 2 young males captured on the reef and another taken in the sea at a depth of 36 m.

Stat. 240. November 22—December 1. Banda-anchorage. From 9—36 m. Black sand. Coral. Lithothamnion-bank in 18—36 m. 2 males and 7 females.

Stat. 258. December 12/16. Tual-anchorage, Kei-islands. 22 m. Lithothamnion, sand and coral. 1 male.

Stat. 273. December 23/26. Anchorage off Pulu Jedan, East coast of Aru-islands. (Pearl-banks). 13 m. Sand and shells. 2 young males.

Stat. 282. January 15/17. 8° 25'.2 S., 127° 18'.4 E. Anchorage between Nusa Besi and the N.E.-point of Timor. Sand, coral and Lithothamnion. 27—54 m. 1 young male.

Stat. 313. February 14/16. Anchorage East of Dangar Besar, Saleh-bay. Depth up to 36 m. Sand, coral and mud. 4 males and 5 females.

It appears to me very probable that the species which has been described by ALCOCK (l. c.) as *Metap. mogiensis*, is another as that of Miss RATHBUN, because the petasma and especially the thelycum show a different form in both species. The specimens collected by the "Siboga" are unfortunately all young, they are perhaps to be referred to ALCOCK's *Pen. mogiensis*.

The largest specimens are the females collected at Stat. 240, which are nearly 60 mm. long. As regards the shape and the toothing of the rostrum, these specimens closely resemble Miss RATHBUN's figure of *Pen. mogiensis* (l. c., p. 40), but the branchiostegal spine is smaller and more resembles that of ALCOCK's species (l. c. fig. 15). The rostrum is 8 + 1- or 9 + 1-toothed, the epigastric tooth situated at the anterior fourth of the carapace; it hardly attains the far end of 2nd antennular article. In a female, long 60 mm., the carapace without the rostrum and measured near the dorsal line, appears to be 11,5 mm. long; the 6th abdominal somite, 7,75 mm. long and 5 mm. broad, resembles that of the japanese *Pen. mogiensis*; the telson is 9 mm. long.

The external maxillipeds reach to the end of the antennal scales, the legs of the 4th pair to the end of the antennal peduncles, and those of the 5th extend just beyond the eyes. All the thoracic legs bear an exopod.

The ventral spines between the bases of the feet of the 2nd pair are well developed, while in the japanese *mogiensis* they are rudimentary. The thelycum much agrees with ALCOCK's fig. 15 *b*, but the anterior of the two laminae between the bases of the feet of the 5th pair bears only one tooth at its outer angles. The divergent median teeth between the legs of the 4th pair show a somewhat other form than in ALCOCK's figure.

The 9 specimens from Stat. 313 are still younger.

The rostrum of the young male from Stat. 258 is 7 + 1-toothed and closely resembles ALCOCK's fig. 15, the upper margin being slightly arcuate.

The two males from the Jedan islands are 42 mm. long; of the petasma of the male from Stat. 282, only 25 mm. long, the two branches are still separated.

When this species might afterwards prove to differ from those described by Miss RATHBUN and ALCOCK under the name of *Met. mogiensis*, I should propose for it the name of *Pen. hilarulus*.

†28. *Penaeopsis quinquedentatus* (de Man).

Penaeus sp. J. G. de Man, in: Abhandl. Senckenb. Naturforsch. Gesells. XXV, 1902, p. 906, Taf. XXVII, Fig. 65.

Metapeneus quinquedentatus J. G. de Man, in: Notes from the Leyden Museum, Vol. XXIX, 1907, p. 133.

Stat. 37. March 30/31. Sailus ketjil, Paternoster-islands. 27 m. and less. Coral and coralsand. 1 male and 1 female.

Stat. 99. June 28/29/30. 6°7'.5 N., 120°26' E. Anchorage off North-Ubian. 16—23 m. Lithothamnion-bottom. 1 male and 1 female.

Stat. 109. July 5/6. Anchorage off Pulu Tongkil, Sulu-archipelago. 13 m. Lithothamnion-bottom. 1 male.

Stat. 164. August 20. 1°42'.5 S., 130°47'.5 E. Near West New Guinea. 32 m. Sand, small stones and shells. 1 young damaged female.

Stat. 184. September 11/12. Anchorage off Kampong Kelang, South coast of Manipa-island. 36 m. Coral, sand. 4 males and 2 females.

Stat. 209. September 23. Anchorage off the south point of Kabaëna-island. 22 m. Coarse sand. 1 male and 2 females.

Stat. 240. November 22 till December 1. Banda-anchorage. From 9—36 m. Black sand. Coral. Lithothamnion-bank in 18—36 m. 7 males and 9 females.

A new species of the *Akayebi*-group, without stridulating organs. Body tomentose. One of the largest specimens, the male from Stat. 109, is 45 mm. long. In its general appearance this species much resembles ALCOCK's *Pen. mogiensis* (Catal. Indian Decap. Crust. Part III. Macrura, 1906, Pl. V, Fig. 15). The rostrum, that is directed obliquely upward, is short, reaching only to the far end of 1st antennular article, hardly beyond the eyes. It is almost in all the specimens armed with five rather large teeth, in addition to the somewhat smaller epigastric tooth; the five teeth are equidistant, the distance between the foremost tooth and the tip is a little shorter than this tooth is itself long. Lower margin straight, ascending, while a line uniting the tips of the teeth and of the rostrum usually appears slightly arcuate. Epigastric tooth situated at the anterior fourth of the carapace. Supra-orbital, branchiostegal and antennal spines small. The carapace of the male from Stat. 109 is $8^1/_3$ mm. long, measured near the dorsal median line and without the rostrum; 6th abdominal somite $6^1/_3$ mm. long, three-fourths the length of the carapace, and 3,75 mm. broad. The arcuate subhepatic groove is as well marked as in ALCOCK's *Pen. mogiensis*. The telson, a trifle longer than the 6th somite, is a little shorter than the caudal swimmerets, that are of equal length. Sometimes, as in the female from Stat. 99, which is 37 mm. long, the rostrum is straight above, not arcuate; rarely, as in a female from Stat. 184, there are 6 teeth on the rostrum instead of the typical 5.

Lower (inner) antennular flagellum as long as the two last joints of the peduncle taken together, almost half as long as the peduncle.

The external maxillipeds reach, in the male, to the apex of the antennal scales; the bispinose legs of the 1st pair extend with the fingers beyond the antennal peduncles, those of the 3rd reach with their chelae beyond the antennal scales, those of the 4th project to the end of the antennal peduncles, while the legs of the 5th pair reach with their dactyli beyond the eyes. The 2nd legs are unispinose, those of the 3rd pair are unarmed. All the thoracic legs bear an exopod.

The left branch of the petasma extends beyond the right, its rounded tip is curved towards the latter; right branch less enlarged than in *Pen. mogiensis*. Ventral spines between the bases of the feet of the 2nd pair well developed.

The thelycum consists of the following parts. There is a transverse plate posteriorly, as in the other species of this group, and cut into three lobes, the broader median lobe hardly reaches beyond the outer ones; one observes, between the legs of the 4th pair, a sunken plate nearly as broad as long, that bears a small tooth in the middle of its anterior border and a small rounded tubercle or prominence at each postero-external angle; the two teeth, however, that occur in *Pen. mogiensis* (Rathb.), in *Pen. perlarum* (Nob.) and in the two species described p. 69 and 70, are wanting completely; finally between the posterior trilobate lamina and the sunken plate at either side a transverse lobe occurs, that is directed obliquely outward, nearly as in the *Penaeopsis* sp. described p. 70. The largest females are 40 mm. long.

The specimens from Stat. 240 were taken together with those of the *Penaeopsis* sp., described p. 70.

Penaeus Palmensis Hasw. from Palm Island is closely related, but nothing is known about petasma and thelycum and the rostrum is 7 + 1-toothed.

† 29. *Penaeopsis Borradailei* n. sp.

Stat. 131. July 24/25. Anchorage off Beo, Karakelang-islands. Reef. 1 female.
Stat. 193. September 13/14. Sanana-bay, East coast of Sula Besi. Reef. 1 female.
Stat. 234. November 19/20. Nalahia-bay, Nusa-Laut-island. Reef. 1 female.

A new species, dedicated to Dr. L. A. BORRADAILE of Selwyn College, Cambridge, appertaining to the *Akayebi*-group that is characterized by the carapace being rounded behind the epigastric spine, by the lateral margins of the telson being spinulose and by all the pereiopods bearing an exopod.

Carapace, telson and the shallow grooves of the abdomen very finely tomentose. Rostrum distinctly ascending, reaching in the largest specimen, that from Stat. 193, to the middle of 3rd antennular article, in the female from Stat. 131 almost to the end of the peduncle, but in the young specimen from Stat. 234 hardly to the extremity of the 2nd article. The rostrum which in a lateral view appears rather narrow and tapering, is armed with 8 teeth, all situated on the free part of the rostrum; these teeth are equidistant, extend until to the tip and from the 3rd and the 4th that are equal, decrease in size distally. The epigastric spine, a little smaller than the 1st tooth of the rostrum, is situated immediately before the anterior third of the carapace. Lower margin almost straight. A small, acute, orbital tooth. Antennal spine about as large as the hepatic and as the branchiostegal spine, the latter situated not quite at the rounded, antero-inferior angle of the carapace.

The 1st—4th abdominal terga are rounded, the 4th and the 5th ending in two acute teeth; 5th obtusely carinate, except the proximal fourth, 6th tergum rather sharply carinate and terminating in a small acute tooth. Measured on the median line the 5th somite appears a little more than half as long as the 6th, the proportion being as 4 : 7. Quite as in the japanese *Pen. Dalei* (Rathb.), the 6th somite appears two-thirds as long as the length of the carapace, the latter measured from between the orbital tooth and the rostrum backward; proportion between the length of the 6th somite and its width in the middle as 7 : 4, just as in *Pen. Dalei*. The lateral margins of the telson, that is slightly shorter than the 6th somite, are armed with 1 fixed and 3 articulate spines; the first movable spine, inserted about in the middle, is half as long as the 2nd, the 2nd half as long as the 3rd and the 3rd a little longer than the contiguous, fixed spine; the 1st movable spine is about 3-times as far distant from the 2nd as the 2nd from the 3rd. Telson much shorter than the uropods.

Third antennular article measuring two-thirds the length of the 2nd; the tapering, inner (lower) flagellum is as long as the 2nd and 3rd antennular articles taken together, the upper flagellum, as long as the inner, is widened along two-thirds of its length, while the distal third part is tapering and filiform.

Antennal scale distinctly longer than the antennular peduncle, reaching almost by the whole length of 3rd article beyond it.

The external maxillipeds extend to a little beyond the middle of the scaphocerite, just reaching beyond the extremity of basal antennular article.

Of the 1st pair of legs both the coxa and the ischium are armed with a spine, of the 2nd pair the coxa alone, while the 3rd pair is quite unarmed. The 1st pair of legs is of a rather stout shape and reaches to the extremity of the antennal peduncle; carpus a little longer than the merus, chela nearly two-thirds as long as the carpus, fingers a little shorter than the palm. Second legs a little longer and a little more slender than the 1st, 3rd slightly longer and more slender than the 2nd; the 3rd legs project with the fingers almost beyond the eye-peduncles, carpus a little more than twice as long as the chela, fingers almost two-thirds as long as the palm. The legs of the 4th and 5th pairs are almost equally long, the 4th extend to the base of the carpocerite, the 5th are hardly shorter and reach to the distal extremity of the carpus of the 1st. All the legs, also those of the 5th pair, bear an exopod.

A pair of well developed slender spines between the legs of the 2nd pair. A single median acute spine situated on a transverse prominence between the bases of the feet of the 4th pair; this prominence is united posteriorly by a short, median, longitudinal ridge with the posterior part of the thelycum. This posterior part, deeply grooved in the middle, is bilobate and consists of two almost circular lobes that are rounded anteriorly and the outer surface of which is slightly convex. The posterior part of the thelycum is situated between the legs of the last pair and is bounded posteriorly by a narrow ridge, on the middle of which 5 or 6 setae are inserted.

The largest specimen is nearly 56 mm. long.

Remarks. The japanese *Pen. Dalei* (Rathb.) and *acclivis* (Rathb.) are closely related species but are distinguished, at first sight, by the different form of the thelycum. Very closely allied is, no doubt, also *Pen. commensalis* (Borr.) (L. A. Borradaile, in: Proc. Zool. Soc. 1898, p. 1001, Pl. LXIII, Figs. 1—1*b*), a species which, on the coast of the island of Rotuma, is living in a green and yellow Actinian, but of which unfortunately the female is unknown. As Dr. Borradaile informed me, the single type specimen of this *Pen. commensalis* does not more exist in the Museum at Cambridge and he fears it must have been lost. Dr. Borradaile to whom I sent the specimen from Stat. 131 for examination, was, however, inclined to think that the "Siboga" species is not *Pen. commensalis* and I am of the same opinion. In the species from Rotuma, indeed, the antennular peduncle is longer than the scaphocerite, in the "Siboga" species shorter than it and the rostrum is horizontal, not ascending; the 6th abdominal somite, finally, appears, in the figure, comparatively much longer, more than three-fourths as long as the carapace.

In a paper on the Penaeidae, published September 1881 in "The Annals and Magazine of Natural History", a *Penaeus Philippii* from the Philippine Islands was described by Spence Bate, a species not mentioned by Dr. Alcock in his useful "Revision of the "Genus" *Peneus*" (ibidem, Ser. 7, Vol. XVI, 1905). This species also seems to be related to *Pen. Borradailei*, but the antennular peduncle of *Pen. Philippii* is not longer than the rostrum and the latter bears only 6 or 7 teeth; the antennular flagella are half as long as the peduncle. Unfortunately

this *Pen. Philippii*, that was taken in about 100 fathoms of water, has never been figured and the description is indeed too short; but it seems to me probable that this *Pen. Philippii* is identical with the *Pen. philippinensis* Sp. Bate of the Report on the Challenger Macrura, a species, which strange enough was in this Report not recorded from the Philippines! The description or rather diagnose of *Pen. Philippii* is in perfect accordance with that of *Pen. philippinensis*.

30. *Penaeopsis Evermanni* (Rathb.).

Metapenaeus evermanni M. J. Rathbun, in: U. S. Fish Commission Bulletin for 1903, Part III. Wash. 1906, p. 904, Pl. XX, Fig. 1.

Stat. 65a. May 6. Near Tanah Djampeah. From 400 m. upward to 120 m. Pale, grey mud, changing during haul into coral bottom. 1 young male.
Stat. 96. June 27. South-east side of Pearl-bank, Sulu-archipelago. 15 m. Lithothamnion-bottom. 1 young male.

This species was hitherto only known by a female, long 58,5 mm., captured near the Hawaiian Islands. It is at first sight distinguished by two median spines situated behind one another between the legs of the 4th and 5th pairs.

The male from Stat. 65a is but 23 mm. long. The ascending rostrum reaches to the end of the eye-peduncles, is arcuate above, nearly straight below and armed with 6 teeth in addition to the epigastric tooth; these 6 teeth reach to the tip, gradually decreasing in size and the 2nd is situated just above the anterior margin of the carapace; the epigastric tooth is situated a little before the middle of the carapace. The antero-inferior angle of the latter is rectangular, a small branchiostegal spine occurs just above the angle; the post-antennular (antennal) spine and the hepatic spine are of equal size, the latter situated below the base of the 1st tooth of the rostrum, before the level of the epigastric tooth. The subhepatic groove (anterior part of the cervical groove) defining the branchial region anteriorly, is conspicuous, as also the gastro-hepatic groove.

Second abdominal tergum obtusely carinate, more distinctly in the male from Stat. 96, which is 22 mm. long, than in the other; the four following somites are also carinate, the carinae of the 3rd—5th being deeply cleft at their posterior end; the rather broad carina of the 3rd somite is flattened, like also that of the 4th, the carina of the 5th is obtuse, that of the 6th moderately sharp.

The carapace of the male from Stat. 65a is broken. That of the other specimen is 4,5 mm. long, without the rostrum and measured near the dorsal median line; the 6th abdominal somite, measured near the median line, appears to be 2,75 mm. long and it is 2,2 mm. high. The telson, 3,8 mm. long, is decidedly longer than the 6th somite and extends just beyond the uropods that are of equal length; in the other male the telson is just as long as the uropods. The telson bears at either side four marginal spines, the last of which is fixed.

The external maxillipeds extend with half their dactyli beyond the tip of the antennal scales and the 3rd legs reach beyond them with a little more than their chelae. Both the 2nd and the 3rd joint of the stout legs of the 1st pair are armed with a strong spine, but it remained doubtful whether the 2nd pair bore also a spine or not. The legs of the 5th pair that are also

provided with an exopod, reach to the end of the eyes; their nearly straight dactyli are half as long as the propodi. Just as in the female described by Miss RATHBUN, one observes a pair of strong spines between the bases of the legs of the 2nd pair. The spine between the bases of the 4th pair is distinctly larger than that between those of the 5th. The branches of the petasma are not yet united with one another in these two young specimens.

General distribution: Molokai Island (RATHBUN).

31. *Penaeopsis Challengeri* n. nom.

Syn.: *Penaeus serratus* C. Spence Bate, Report Challenger Macrura, 1888, p. 268, Pl. XXXVII, Fig. 1. (nec: *Penaeopsis serratus* A. Milne-Edwards).

Stat. 253. December 10. 5°48'.2 S., 132°13' E. Near Kei-islands. 304 m. Grey clay, hard and crumbly. 1 young female.

In their important paper on the Penaeidae and Stenopidae collected by the "Blake", published at Cambridge, U. S. A., in 1909, A. MILNE-EDWARDS and BOUVIER have described as a new variety *antillensis* of *Penaeopsis serratus* A. M.-Edw. a form, distinguished from the typical species by the arcuate shape of the rostrum and by the existence of a median spine on the sternum between the bases both of the 4th and of the 5th pairs of legs. They are, however, inclined to consider this form as the young state of the american *Penaeopsis serratus* A. M.-Edw., which is described in detail in the same paper. The specimen now which was taken at Stat. 253 and which is only 43 or 44 mm. long, fully accords with that variety *antillensis* as regards the armature of the sternum with two spines situated behind one another and therefore it is considered by me to be the young form of that species which (l. c.) was described by SPENCE BATE also under the name of *Pen. serratus*. This species, however, that was captured by the "Challenger" at the Fiji Islands and in Torres Strait, seems to be different from the *Penaeopsis serratus* that occurs in the Atlantic and therefore the name of *Pen. Challengeri* is here proposed for it. Not only, indeed, does the thoracic sternum, both in the male and in the female, show a different appearance in the two species according to the figures that have been published, but the rostrum is apparently also different. In the american *Pen. serratus* A. M.-Edw. the rostrum usually runs straight forward or sometimes it is directed obliquely upward (vide: Memoirs Mus. Comp. Zoology at Harvard College, XXVII, N° 3, 1909, p. 222, Pl. IV, Fig. 1), but in the indopacific *Pen. Challengeri* it is distinctly arched in the adult species (SPENCE BATE, l. c. Fig. 1) and, both in the adult, typical, american species and in the variety *antillensis*, two rostral teeth are always situated on the carapace, while in the indopacific form all the teeth are situated on the rostrum proper.

In the specimen from Stat. 253 the rostrum that is distinctly arched with the acute tip curved downward, appears as long as the eye-peduncles, not yet reaching to the end of the basal antennular article; it is armed above with 8 teeth that are all situated on the rostrum itself; the 1st tooth which is a little smaller than the 2nd, occurs immediately before the orbital margin. The 2nd—5th teeth are of the same size, the following become progressively smaller; they extend to near the tip, and the foremost tooth is just as long as the tip. Epigastric

tooth situated just before the middle. The orbital margin runs somewhat as a S, but there is no trace of an orbital tooth. The three other spines on the side of the carapace are acute, and, as regards the hepatic and cervical grooves and carinae, this species fully resembles the atlantic *Pen. serratus*. According to SPENCE BATE the "Challenger" species should bear 12 or 13 teeth on the rostrum, the smaller number occurring in our specimen may be due to its younger age.

Abdomen and telson agree with BATE's description; the tip of the telson reaches a little beyond the spine on the margin of the outer uropod, but the telson is distinctly shorter than the endopod of the caudal fan.

The eye-peduncles and the two pairs of antennae agree with the description and the figures in the Challenger Report. The 3rd article of the antennular peduncle extends as far forward as the obtuse, inner extremity of the scaphocerite; the upper flagella are a little shorter than the peduncle, the lower are incomplete.

The external maxillipeds reach to the end of the penultimate antennular article.

With regard to the thoracic legs, I wish to remark that I did not observe an exopod on any of these legs, and therefore this species was first referred by me to the genus *Parapenaeus* and considered to be related to *Parap. rectacutus*: this fact is perhaps also due to the young state of this specimen. The three anterior legs bear an epipod. The first pair of legs that are bispinose, reach with the fingers beyond the antennal peduncle, the 2nd to the end of the eye-peduncles and the 3rd reach with their chelae beyond them; the 4th are but a little longer than the 1st and the 5th are as long as the external maxillipeds. In the 5th pair of legs the merus is as long as the carpus, the propodus only a little more than half as long and the dactylus measures hardly one-third the length of the merus. The sternum is armed, as in *Penaeopsis serratus* A. M.-Edw., var. *antillensis*, with a median spine between the bases of the 5th legs and with another smaller one between those of the 4th, but the rounded tubercle that in the variety *antillensis* occurs at either side of the posterior spine, is wanting in this specimen.

There is no trace of a petasma.

General distribution: Fiji Islands (SPENCE BATE); Torres Strait (SPENCE BATE).

Parapenaeus S. I. Smith (sensu restricto).

(*Neopenaeopsis* Bouvier).

The genus *Parapenaeus*, as restricted by ALCOCK and BOUVIER, is at present represented by 8 species, 4 of which are inhabitants of the Atlantic Ocean and the Mediterranean, while the other 4 are distributed through the Indopacific. *Parap. longirostris* (H. Luc.) occurs not only in the Mediterranean and the Adriatic Seas, from the shores of Asia Minor to those of Spain, but has also been observed in the East Atlantic from the coast of Portugal to that of Morocco. This species is represented on the east coast of the United States by *Parap. politus* S. I. Smith, which, however, has also been observed in the Gulf of Paria. *Parap. paradoxus* Bouv. inhabits the Gulf of Mexico and is, probably, closely related to *Parap. politus*, a species which is still insufficiently known. The fourth atlantic form is *Parap. americanus* Rathb., that occurs in the

Sea of the Antilles. *Parap. fissurus* (Sp. Bate) is distributed from New Britain, the Philippines and the Arafura Sea as far as the east coast of British India and has been captured by the "Siboga" at four different stations on the coasts of Timor, Flores and Sumbawa. *Parap. Investigatoris* Alc. & And. occurs in the Bay of Bengal and was taken by the "Siboga" off the Kei Islands. The third indopacific species is *Parap. longipes* Alcock, an inhabitant both of the west and of the east coast of British India and collected by the "Siboga" in the Java Sea and off the coast of Timor. The last species, finally, *Parap. rectacutus* (Sp. Bate), has the same distribution as *Parap. fissurus*, ranging from the Fiji Islands and the Philippines as far as the Bay of Bengal and the east coast of India; it was collected by this expedition in the Sea between Celebes, Java and Sumbawa. The four known indopacific species are all inhabitants also of the Indian Archipelago.

The atlantic representatives of this genus are rarely found at a depth of 500 meter (*Parap. longirostris*), but generally occur in more shallow water. The mediterranean species, indeed, has been captured not only at a depth of 500 meter, but also between 80 and 100 m. and even between 40 and 75 m.; *Parap. politus* is recorded not only from 142 fathoms, but also from between 31 and 34 fathoms. *Parap. paradoxus* was found in water of 84 fathoms and *Parap. americanus* at depths of 116, 191 and 220—225 fathoms. *Parap. fissurus* was taken by the "Siboga" at a depth of 274 m., but also in water of 112 m. and the same species was collected off the Ganjam coast at a depth of 45 fathoms. *Parap. longipes* is not known from water deeper than 88 meter and *Parap. Investigatoris* occurs at 133 fathoms, but also between 370 and 419 fathoms. *Parap. rectacutus*, finally, was likewise observed between 370 and 419 fathoms, but was also taken by the "Challenger" in water of 95 fathoms.

Concerning the indopacific species I wish still to observe 1° that in *Parap. rectacutus* all the pereiopods are provided with very small exopods and that there is an epipod on the legs of the 3rd pair; 2° that the three other species bear no exopods on any of the five thoracic legs and no epipod on those of the 3rd pair. The fact that there are no epipods on the 3rd legs has not been mentioned in ALCOCK's paper on the Prawns of the *Peneus*-group, published in 1906, though this character was already recorded, in a previous paper, by ALCOCK and ANDERSON, namely in: Journal Asiatic Soc. Bengal, Vol. LXIII, Part II, N° 3, 1894, p. 144, at least for one of the three species, viz. for *Parap. Investigatoris*, which in that paper was wrongly mentioned as *Parap. fissurus*. When we moreover take into consideration that the carapace of *Parap. rectacutus* lacks the sutures observed in the three other species and also the characters of the telson and of the antennular flagella, then the question arises whether this species ought really to be included with the three others in the same genus. I don't like, however, to give an opinion on this subject, because I had no opportunity to study the atlantic species of *Parapenaeus*.

In his important work "Crustacés décapodes (Pénéidés) provenant des campagnes de l'Hirondelle et de la Princesse-Alice", published in 1908, Professor BOUVIER remarks, p. 102, that the genus *Parapenaeus* is represented by about 18 species, which, unfortunately, are not enumerated, excepting *P. akayebi* Rathb., *P. megalops* Smith and three species that are considered also by me to appertain to the genus *Parapenaeus*. I had no opportunity to study *P. megalops*, which, in this Report, is referred to the genus *Penaeopsis* and I am unknown with the other

species, but I wish to remark that in *Penaeopsis akayebi* (Rathb.), which, however, is identical with *Pen. barbatus* (de Haan), all the thoracic legs bear an exopod (DE MAN, in: Trans. Linn. Soc. London, 1907, p. 433) and that in all the species of *Penaeopsis* collected by the "Siboga", fourteen in number, all or all but the last pair of thoracic legs are provided with exopods, excepting only *Pen. Challengeri*, the new name for SPENCE BATE's *Pen. serratus*.

† 32. *Parapenaeus fissurus* (Sp. Bate).

Penaeus fissurus C. Spence Bate, in: Ann. Mag. Nat. Hist. (5) VIII, 1881, p. 180 and in: Report Challenger Macrura, 1888, p. 263, Pl. XXXVI, Fig. 1.
Penaeus fissurus L. A. Borradaile, On the Stomatopoda and Macrura brought by Dr. WILLEY from the South Seas, 1899, p. 395, 404.
Parapeneus fissurus A. Alcock, Ann. Mag. Nat. Hist. (7) XVI, 1905, p. 520 and Catal. Indian Decap. Crust. Part III. Macrura. Fasc. 1. Calcutta 1906, p. 31, Pl. V, Fig. 16, 16*a*, *b*.

Stat. 289. January 20. 9° 0′.3 S., 126° 24′.5 E. Timor Sea. 112 m. Mud, sand and shells. 1 young male and 1 young female.
Stat. 302. February 2. 10° 27′.9 S., 123° 28′.7 E. Near Rotti-island. 216 m. Sand and coral sand. 22 males and 6 females.
Stat. 306. February 8. 8° 27′ S., 122° 54′.5 E. Lobetobi-strait. 247 m. Sandy mud. 3 males and 10 females.
Stat. 312. February 14. 8° 19′ S., 117° 41′ E. Saleh-bay, North coast of Sumbawa. 274 m. Fine, sandy mud. 4 males and 6 females.

Both by SPENCE BATE (l. c. 1888, Pl. XXXVI, Fig. 1) and by ALCOCK (l. c. 1906, Pl. V, Fig. 16) the rostrum of this species is figured as projecting straight forward and hardly reaching beyond the 1st joint of the antennular peduncle; the specimen that was figured by SPENCE BATE was a female, that figured by ALCOCK a male. It is therefore very remarkable that almost in all the more than 50 specimens collected by the "Siboga", which are of different size and age, the tip of the rostrum is more or less distinctly turned upward nearly as in *Parapeneopsis sculptilis* (A. Alcock, l. c. 1906, Pl. VII, Fig. 22), so that the rostrum presents a distinct double curve. Only in the two young specimens from Stat. 289 the male of which measures 55 mm., the female 72 mm., the rostrum appears just as long as in the quoted figures. In the male specimens the rostrum usually reaches to the far end or to near the far end of the 2nd antennular article; rarely it reaches to the middle of this article or extends even but a little beyond the 1st, as in an almost adult male from Stat. 312, in which the rostrum bears 5 teeth besides the epigastric one. In a young male from Stat. 302, long 100 mm., the slender rostrum reaches to the middle of the 3rd article, but this is a rare exception; it bears 6 teeth besides the epigastric tooth, the tip is slightly turned upward and twice as far distant from the foremost tooth as this tooth from the penultimate. In the female the rostrum is generally longer than in the male, reaching to the middle of the 3rd article, to the end of the peduncle or sometimes even slightly beyond it. According to SPENCE BATE and ALCOCK the rostrum should carry 6 teeth in addition to the epigastric tooth. Precisely in half the number of the 28 males in which the rostrum is not broken off, there are six teeth on it besides the epigastric tooth; in 6 males five teeth were observed; in 3 males seven and in 4 males six teeth of which the foremost, however, was rudimentary. In an adult male, long

132 mm., from Stat. 302, the rostrum that reaches straight forward, to just beyond the 1st antennular article, shows distinctly seven teeth; these teeth gradually decrease in size from the 3rd to the 7th which is very small and rudimentary. The rostrum of 9 females out of the 22 that were examined was armed with six teeth in addition to the epigastric tooth; in 6 females I observed five teeth and finally there were 4 females with seven and 3 with six teeth, the foremost of which was again rudimentary. The usual number proved therefore to be six, but rostra with five teeth are not at all rare; in some specimens a seventh resp. a sixth, though rudimentary, tooth occurs. The quite distinct post-rostral carina is not grooved, but carries sometimes one or two shallow pits.

It is remarkable, indeed, that in SPENCE BATE's figure of a probably adult female the rostrum appears hardly longer than the 1st antennular article, for among the 22 females collected by the "Siboga" a similar, short rostrum does only occur in two young females from Stat. 312.

In the adult male the inner flagellum of the upper antennae is $1^1/_4$—$1^1/_3$-times as long as the peduncle, the outer is one-third shorter; the widened and grooved part of the outer flagellum occupies about one-third of its length; in the adult female the flagella are shorter, the inner being nearly as long as the peduncle.

The scaphocerite of the outer antennae is, in the male, usually a little shorter, but in the female somewhat longer than the antennular peduncle. Not only the legs of the 5th and of the 4th pairs, also those of the 3rd are devoid of an epipod.

Parapenaeus fissurus attains the length of 135 mm.

General distribution: Philippine Islands (SPENCE BATE); Talili Bay, New Britain (BORRADAILE); Ganjam coast, Gulf of Martaban, Andamans (ALCOCK).

33. *Parapenaeus Investigatoris* Alc. & And.

Parapenaeus investigatoris A. Alcock and A. R. S. Anderson, Ann. Mag. Nat. Hist. (7) III, 1899, p. 279; Illust. Zoology Investigator, Crust. Pl. XLI, Fig. 1, 1*a*, 1*b*.
Parapenaeus fissurus A. Alcock and A. R. S. Anderson, Journ. Asiat. Soc. Bengal, LXIII, Part II, N° 3, 1894, p. 144. (nec SPENCE BATE).
Peneus (Parapeneus) investigatoris A. Alcock, Catal. Indian Deep-Sea Crustacea, Calcutta, 1901, p. 18.
Parapeneus investigatoris A. Alcock, Catal. Indian Decap. Crust. Part III. Macrura. Fasc. 1. Calcutta, 1906, p. 32, Pl. VI, Fig. 17 and 17*a*—*c*.

Stat. 254. December 10. 5°40′ S., 132°26′ E. Near Kei-islands. 310 m. Fine, grey mud. 1 young male.

The rostrum of this specimen, which is 48 mm. long, is somewhat directed upward and carries 6 teeth besides the epigastric tooth. Measured along the carinate, upper margin the 5th abdominal somite appears to be 4 mm. long, the 6th 9 mm. The telson is broken off just beyond the lateral prongs.

There are no epipods on the three last thoracic legs, a fact already mentioned by ALCOCK and ANDERSON (l. c. 1894).

General distribution: Off Pulicat; Gulf of Manár; Andaman Sea, N. E. and N. of North Island (ALCOCK).

34. *Parapenaeus longipes* Alcock.

Parapeneus longipes A. Alcock, Ann. Mag. Nat. Hist. (7) XVI, 1905, p. 525 and Catal. Indian Decap. Crust. Part III. Macrura. Fasc. 1. Calcutta, 1906, p. 33, Pl. VI, Fig. 18, 18*a*, *b*.

Stat. 2. March 8. 7° 25′ S., 113° 16′ E. Madura-strait. 56 m. Grey mud with some radiolariae. 1 female.

Stat. 47. April 8/12. Bay of Bima, near south fort. 55 m. Mud with patches of fine coral sand. 2 males.

Stat. 294. January 23. 10° 12′.2 S., 124° 27′.3 E. Timor Sea. 73 m. Soft mud with very fine sand. 2 males, the younger of which bears a Bopyrid in the carapace.

Stat. 318. February 22. 6° 36′.5 S., 114° 55′.5 E. Java Sea. 88 m. Fine, yellowish grey mud. 2 females.

Stat. 320. February 23. 6° 5′ S., 114° 7′ E. Java Sea. 82 m. Fine, grey mud. 1 female.

The larger male from Stat. 294 is 65 mm. long. The rostrum, that reaches the far end of the 1st joint of the antennular peduncle, just beyond the eyes, bears 5 teeth in addition to the epigastric tooth, which is smaller than these teeth and the 1st tooth is situated on the carapace. The post-rostral carina is conspicuous and reaches until not far from the posterior margin of the carapace. At either side of the rostrum the frontal margin is emarginate, the outer angle being rather sharp. The 3rd abdominal somite is rounded, the 4th is carinate on three-fourth parts of its length, the carina ending in a sharp tooth, as on the two following somites. The 6th somite, about twice as long as the 5th, appears as long as the telson. The inner uropod is almost as much shorter than the outer as the telson is shorter than the inner: in Alcock's Fig. 18 the latter appears too long. The flagellum of the outer antennae is as long as the body.

The other male from this Station is much younger, the two lobes of the petasma are not yet united with one another. The rostrum, as long as in the described specimen, is armed with 6 teeth in front of the epigastric tooth.

The larger male from Stat. 47 is 70 mm. long. The rostrum is abnormal, in regeneration. The telson is slightly shorter than the 6th somite, which is twice as long as the 5th. The 2nd article of the antennular peduncle is almost twice as long as the 3rd; the flagella are subequal, the inner, that measures 14,5 mm., is distinctly longer than the distance (11,5 mm.) between the frontal margin and the far end of the peduncle; the proximal, widened part of the outer flagellum occupies hardly one-third its length. The external maxillipeds reach the end of the 2nd antennular article, the legs of the 1st pair the middle of the antennal peduncle, those of the 3rd are very slightly shorter than the external maxillipeds and the legs of the 5th pair reach almost the end of the scales, which are a trifle longer than the peduncle of the upper antennae. The legs of the 1st pair are bispinose, the following are unarmed.

The younger male from Stat. 47 is 33 mm. long. Rostrum reaching the end of the eye-peduncles with 6 teeth besides the epigastric tooth. The 5th pair of legs reaches almost the end of the antennal scales.

The female from Stat. 320 is adult, 78 mm. long, somewhat larger than the described males. The rostrum that is armed with five teeth in addition to the epigastric tooth, reaches the middle of the 2nd joint of the antennular peduncle and its acute tip is slightly curved upward. Post-rostral carina as in the male. The carina of the 4th somite begins almost at the

anterior end of the tergum; telson as long as the 6th somite. Longer (inner) flagellum one-fourth shorter than the distance (12 mm.) between the end of the peduncle and the frontal border of the carapace. Antennal flagella as long as the body. The external maxillipeds extend just beyond the antennal scales; the legs of the 1st pair reach to the end of the antennal peduncles, those of the 3rd to the middle of the terminal joint of the antennular peduncle and the legs of the 5th pair extend almost with half the length of their propodi beyond the antennal scales.

Both in the male and in the female the three last pairs of thoracic legs bear no epipod, just as in the genus *Parapeneopsis*, a fact of which Col. ALCOCK (l. c. 1906) makes no mention.

General distribution: Off Ganjam coast, Ganjam and Vizagapatam, Mangalore (Malabar coast), Sandheads (ALCOCK).

† 35. *Parapenaeus rectacutus* (Sp. Bate).

Penaeus rectacutus C. Spence Bate, Report Challenger Macrura, 1888, p. 266, Pl. XXXVI, Fig. 2.
Metapenaeus rectacutus J. Wood-Mason, Ann. Mag. Nat. Hist. Oct. 1891, p. 274.
Metapenaeus rectacutus A. Alcock and A. R. S. Anderson, Journal Asiat. Soc. Bengal, LXIII, Part II, 1894, p. 145.
Peneus (Parapeneus) rectacutus A. Alcock, Catal. Indian Deep-Sea Crust. 1901, p. 17.
Parapeneus rectacutus A. Alcock, Catal. Indian Decap. Crust. Part III. Macrura. Fasc. 1. Calcutta, 1906, p. 33, Pl. VI, Fig. 19, 19*a*, *b*.
Illustrations Zoology Investigator, Crust., Pl. XLIX, Fig. 5, ♂, 1901.

Stat. 12. March 14. 7° 15′ S., 115° 15′.6 E. Bali Sea. 289 m. Mud and broken shells. 1 male.
Stat. 38. April 1. 7° 35′.4 S., 117° 28′.6 E. Near Paternoster-islands. 521 m. Coral. 1 female.
Stat. 74. June 8. 5° 3′.5 S., 119° 0′ E. Makassar Strait. 450 m. Globigerina ooze (obviously a thin layer). 3 females.

These specimens, though certainly pertaining to the *rectacutus* of the Challenger Report, apparently show some differences from ALCOCK's description and figures. The rostrum of the male which is 127 mm. long, reaches about to the middle of 3rd antennular article, bears 11 teeth in addition to the small epigastric tooth and is slightly directed upward. Carapace without post-rostral carina. The ridge defining the anterior part of the cervical groove proceeds in a sinuous course obliquely upward towards the hepatic spine as in SPENCE BATE's figure 2, whereas in the quoted figures of the "Illustrations" and in the "Catal. Indian Decap. Crust. 1906", this ridge has a more vertical direction. The 3rd abdominal somite shows not yet any tendency to become carinated. The 6th somite, measured along the upper margin, is one and three-fourth times as long as the 5th. The telson, a little longer than the 6th somite, and about as long as the endopod of the caudal fan, is armed laterally, in front of the fixed lateral prongs, only with two pairs of movable spinules, whereas the specimens, collected by the "Investigator", carried three pairs in front of the fixed spines; the terminal part of the telson, posterior to the latter, appears hastate.

The inner flagellum of the upper antennae shows the characteristic form, first described by ALCOCK and ANDERSON, but both this flagellum and the outer are broken off beyond the

semicircular loop. The scaphocerite reaches just beyond the tip of the antennular peduncle; the flagellum, measuring 235 mm., is almost twice as long as the body.

The external maxillipeds reach almost as far forward as the rostrum. All the thoracic legs bear a rudimentary exopod, hardly 1 mm. long, first described by ALCOCK and ANDERSON (l. c. 1891), but no more mentioned in their later papers. The legs of the 1st pair reach as far as the antennal peduncle; basis and ischium are armed each with a spine. The legs of the 3rd pair extend just beyond the far end of 2nd antennular article, those of the 5th are a trifle shorter: according to ALCOCK's figure 19 (l. c. 1906), the thoracic legs are slightly longer in his specimens, the 5th pair reaching beyond the tip of the antennular peduncles.

Each of the two lobes of the petasma is armed at its distal end with a sharp spine that is directed forward: these two spines are neither mentioned nor figured by Col. ALCOCK.

The three females from Stat. 74 are nearly of the same size as the male, just described. The rostrum that reaches to the end or just beyond the end of the antennular peduncle, bears 10 or 11 teeth besides the epigastric tooth. As regards the other characters of carapace and abdomen, they fully agree with the male. The telson is a trifle shorter than the inner uropod and closely resembles that of the male.

The inner antennular flagellum is a little longer than the peduncle; the outer is one-third shorter, the thickened proximal part is twice as long as the thin distal end. The outer antennae resemble those of the male.

As regards the thoracic legs that are as long as in the male and also provided with rudimentary exopods, it may be remarked that, according to ALCOCK (Cat. Indian Deep-Sea Crust., 1901, p. 18), in the female the basis of the 2nd pair should be armed with a spine: in the females of this collection this spine is wanting. The somewhat younger female from Stat. 38 agrees with the preceding.

General distribution: Off Matuku, Fiji Islands (SPENCE BATE); Philippine Islands, between Bohol and Zebu (SPENCE BATE); off Pulicat (Madras), South of Port Blair, (Andamans), North of North Andaman Island (ALCOCK).

Atypopenaeus Alcock.

The genus *Atypopenaeus* hitherto with certainty comprised only one single species, *Atyp. compressipes* (Hend.), observed off the Madras coast at a depth of 12 fathoms and in the Gulf of Martaban. This species was captured by the "Siboga" in the Bay of Bima, in 55 meters of water. A new species was discovered by this expedition in the same seas, off the coasts of Timor, Flores and Sumbawa, at three Stations in water of 216, 247 and 274 meters.

36. *Atypopenaeus compressipes* (Hend.).

Penaeus compressipes J. R. Henderson, in: Trans. Linn. Soc. London, Zool. Ser. 2, Vol. V, 1893, p. 450, Pl. XL, Fig. 21, 22.

Atypopenaeus compressipes A. Alcock, Catal. Indian Decap. Crust. Part III. Macrura. Fasc. 1. 1896, p. 45, Pl. IX, Fig. 29, 29*a*.

Stat. 47. April 8/12. Bay of Bima, near south fort. 55 m. Mud with patches of fine coral sand. 1 male.

The carapace, rostrum included, measures 12 mm. and, without it, 9,4 mm.; total length 39 mm., just as long as the single female upon which this evidently rare species was established. The rostrum which projects horizontally forward and hardly reaches the end of the eyes, is armed with 8 teeth in addition to the epigastric tooth; of these 8 teeth two are on the carapace, the 3rd just before the orbital margin and they reach to the tip; the 3rd to the last tooth rapidly decrease in size, so that the foremost tooth is very small. The epigastric tooth, that has the same size as the 2nd rostral tooth, is 3-times as far distant from the 1st tooth as the 1st from the 2nd; post-rostral ridge prominent, reaching almost to the hinder margin of the carapace. Outer orbital angle rather sharp. The branchial regions of the carapace are a little pubescent; they are finely punctate and separated by a strip of larger puncta from the dorsal regions of the carapace. There is a short, transverse suture just above the 4th pair of legs.

The 3rd abdominal somite is conspicuously carinate along two-thirds of its length, the anterior third part being smooth and there are traces of a carina on the 2nd. Telson distinctly and rather broadly grooved on its anterior half, the groove fading away posteriorly, its lateral margins are unarmed and it is nearly as long as the uropods.

Eye-peduncles a little shorter than the first joint of the antennular peduncle, that exceeds the antennal scales by a third of the terminal joint; the latter measures two-fifths the 2nd article. The upper (outer) flagellum is 17,5 mm. long, one and a half as long as the carapace (rostrum included); the basal thickened part of this flagellum measures one-eighth its total length; the other flagellum is 15 mm. long, little shorter than the upper.

The external maxillipeds reach almost the end of the antennal scales.

Both the basis and the ischium of the 2nd pair of legs are armed with a strong spine and there is also a spine on the second joint of the 3rd legs. I observe moreover a small, sharp tooth at the far end of the ischium of the 1st pair, but the second joint of these legs seems to be unarmed. The 3rd pair of legs extends to the end of the antennal scales. The slender legs of the 5th pair that measure 23 mm., almost twice as long as the carapace (rostrum included), project with a little more than their dactyli beyond the antennal scales. The petasma fully agrees with ALCOCK's figure. The short transverse suture on the carapace above the 4th pair of legs and the spines with which the chelate legs are armed, are described neither by HENDERSON nor by ALCOCK.

Remarks. *Penaeus stenodactylus* Stimps. from Hongkong is most closely allied and perhaps identical. The only differences seem to be the following: the posterior fourth part of the carapace is not carinate, the carapace is finely granulated dorsally and the external maxillipeds extend beyond the antennal scales.

General distribution: Gulf of Martaban (HENDERSON); off the Madras coast (ALCOCK).

† 37. *Atypopenaeus dearmatus* de Man [1]).

J. G. DE MAN, in: Notes from the Leyden Museum, Vol. XXIX, 1907, p. 135.

1) *dearmatus*, disarmed, because this species bears no hepatic spine.

Stat. 302. February 2. 10° 27'.9 S., 123° 28'.7 E. Near Rotti-island. 216 m. Sand and coral sand. 1 female.

Stat. 306. February 8. 8° 27' S., 122° 54'.5 E. Lobetobi-strait. 247 m. Sandy mud. 11 females.

Stat. 312. February 14. 8° 19' S., 117° 41' E. Saleh-bay, North coast of Sumbawa. 274 m. Fine, sandy mud. 1 male, 10 females.

Length of the male 47 mm., of the female 72 mm. Closely resembling its only other congener, *Atyp. compressipes* (Hend.). Carapace, with the rostrum, measuring one-third the total length; carapace finely and closely punctate in the middle, very slightly pubescent. Rostrum ascending, short, reaching in the female, which is larger than the male, just beyond the eyes, to or almost to the end of 1st joint of antennular peduncle; in the single male that was collected, the rostrum extends barely to the end of the eye-peduncles. In addition to the epigastric tooth, situated at the anterior third of the carapace, the rostrum bears 5 or 6 equidistant teeth, the first two of which are always on the carapace; the teeth reach to the tip. In the largest female, that from Stat. 302, which is 72 mm. long, the rostrum bears only 4 teeth, the second of which is situated just above the orbital margin, and the lower margin, usually straight, appears in this specimen slightly curved. In young females from Stat. 306 the rostrum is nearly horizontal, hardly ascending. In old specimens the carapace appears, just behind the epigastric tooth, decidedly scabrous, caused by some minute spinules, but the rest of the carapace seems to be smooth, like the abdomen.

No post-rostral crest or carina, the carapace being rounded on its posterior half. Post-ocular angle distinct, more or less acute. Post-antennular (antennal) spine small, with no buttress, so that, quite as in *Atyp. compressipes*, a post-antennular groove is wanting at all. No hepatic spine. The subhepatic ridge, defining the anterior part of the cervical groove, is quite distinct and ends just near and behind the antero-inferior angle that is rounded, not dentiform; the gastro-hepatic ridge, which is a little shorter than the other and not continuous with it, is also well marked, but hardly reaches to the level of the antennal tooth. There seems to be a short transverse suture across the branchiostegite at the level of the 3rd legs.

The three first abdominal terga are rounded, the 4th and the 5th are distinctly carinate, their anterior third part excepted, and the carina of the 6th somite ends in a small tooth; in one or two adult females from Stat. 312 the 2nd and the 3rd terga show a trace of carination, but these are exceptions. In the adult female from Stat. 302 the carapace, without the rostrum, is 18 mm. long, the 6th somite 8 mm. long, almost half the length of the carapace, and 5,5 mm. broad. The telson, 10,5 mm. long, appears a little longer than the 6th somite and fully agrees, like also the uropods, with that of *Atyp. compressipes*. Eyes in proportion to the peduncle smaller than in the other *Atypopenaeus*, pigment as much developed.

The upper antennae also resemble those of the type species. Antennular peduncle little more than two-thirds the length of the carapace, without the rostrum, but in the largest specimen from Stat. 302 it is a little shorter than two-thirds that length. Flagella subequal. In the male, long 47 mm., the upper (longer) flagellum (21 mm.) is one and a half as long as the carapace, rostrum included, (13,5 mm.), the basal thickened part measures one-eighth that length; the lower flagellum, little shorter, appears distinctly serrated on the upper margin

of its distal half, a short, tapering, terminal portion excepted, and it is fringed with fine, ciliated setae; this flagellum hardly tapers as far as the end of the serrated joints. In the male of *A. compressipes* the lower flagellum is not serrulated, and, regularly tapering, appears more setiform. In the female the flagella are more equal, the longer upper is little longer than the carapace, rostrum included, the proximal fifth part is slightly widened; the lower flagellum is not serrated and tapers as regularly as the upper.

Antennal peduncle reaching as far as the first antennular article; the flagellum measures, in a female long 58 mm., 170 mm., being 3-times as long as the body; antennal scale narrow, in the female just as long as the antennular peduncle, in the male a little shorter.

External maxillipeds as in *A. compressipes*, though only reaching to the anterior third of the antennal scales. The chelate legs grow distinctly longer from the 1st to the 3rd, the carpus of the 3rd being longer than that of the 2nd. The 1st legs, that reach as far as the antennal peduncles, are bispinose, those of the 2nd pair are also bispinose, those of the 3rd bear but one tooth, at the base. Fingers one and a half as long as the palm. Fourth and fifth legs as in *A. compressipes*. In the male the carpus of the 5th legs reaches to the middle of the antennal peduncles, the dactylus and one-fourth of the propodus extend beyond the tip of the antennal scales. In the male from Stat. 312 the propodus of the 5th legs is 7 mm. long, the dactylus 7,7 mm.; there are a few short setae at the sharp extremity of the dactylus. In a female, long 60 mm., from the same Station the right leg of the 5th pair extends with the dactylus and half the propodus beyond the tip of the antennal scale, the propodus (10 mm.) being distinctly shorter than the setiform dactylus which is 10,7 mm. long; of the left leg, however, the propodus is 11,5 mm. long and much longer than the dactylus, that measures 7,2 mm.; in another female the propodus of both legs is also longer than the dactylus. Specimens in which the dactylus is longer than the preceding joint, are probably abnormal individuals.

There are slender exopods on all the thoracic legs; epipods absent from the 3rd maxillipeds and the last two thoracic legs.

The petasma of the male from Stat. 312 is symmetrical, its length is about one-third the length of the carapace without the rostrum and it reaches to the coxae of the 4th pair of legs. The petasma is 3,3 mm. long, the distal fourth part narrows a little and it ends in a pair of short horns, which stand out at right angles to the rest of the organ and each of which terminates in two small teeth or hooks that are slightly curved backward; the two branches of the petasma are united anteriorly, but are along their posterior edges simply apposed and these edges diverge backward; at its distal extremity the width of the petasma is just one-third its length. There is a sharp tooth on the sternal ridge between the 1st pleopods and a smaller on that of the two following.

The thelycum of the adult female from Stat. 302 consists of a cyathiform organ that is broader anteriorly than posteriorly and that is situated between the legs of the 4th and of the 5th pair; the somewhat thickened margins enclose the posterior half of a linguiform plate, the anterior half of which is obliquely ascending between the coxae of the 4th legs. The anterior extremity of this plate is acute, while the posterior is obtuse. Posteriorly the lateral margins of the cyathiform organ pass into the posterior part of the thelycum, i.e. the posterior wall of

the sternum. This posterior part appears broader backward than forward, its lateral margins are slightly concave and make right angles with the anterior margin; it is furrowed longitudinally in the middle, the narrow furrow passing into the cavity of the cyathiform organ and, at either side of the median furrow, one observes another groove that runs obliquely. In younger specimens the three grooves are less distinct, the middle one often wanting.

Somite	Podobranchiae	Arthrobranchiae	Pleurobranchiae
VII	ep	o	o
VIII	ep	2	1
IX	o	2	1
X	ep	2	1
XI	ep	2	1
XII	ep	2	1
XIII	o	1	o
XIV	o	o	o

Trachypenaeus Alcock.

Seven or eight species constitute the small genus *Trachypenaeus*, which is represented both in the Atlantic and in the Indopacific. *Trachyp. constrictus* (Stimps.) occurs along the east coast of North America from the Chesapeake Bay to Porto Rico and Sombrero Island, and *Trachyp. similis* (S. I. Smith) which, however, is regarded by Alcock as a variety of the former, has been observed in the West Indies, near Porto Rico, off the coast of Florida and in the Gulf of Paria. *Trachyp. anchoralis* (Sp. Bate) inhabits the East Indian Archipelago, this species, indeed, was discovered by the "Challenger" in the Arafura Sea, while it was captured by the "Siboga" at four rather remote Stations; it is recorded by Pearson from the coast of Ceylon and by the author of the Report on the Challenger Macrura from off Yokohama, but it seems to me probable that the specimens of the last named locality will prove to belong to *Trachyp. curvirostris* (Stimps.). *Trachyp. granulosus* (Hasw.) is known from Torres Strait. *Trachyp. asper* Alcock is an inhabitant of the Persian Gulf and the Bay of Bengal, while *Trachyp. curvirostris* (Stimps.) seems to be confined to the seas of Japan; this species, indeed, is found along the Pacific coast of that country from the Bay of Awomori to Kagoshima, but it occurs also in the Inland Sea. In Japan, as Kishinouye writes, it is captured in large quantities, used as food and bait and known under the names of "saruyebi", "kosakuyebi" and "atamabuto".

One new species, *Trachyp. salaco*, was discovered by the "Siboga", specimens were captured both at the eastern and at the western extremity of the Banda Sea.

Though two females of *Trachyp. curvirostris* are said to have been caught, in the Inland Sea of Japan, in deep water (de Man, in: Trans. Linnean Soc. London, 1907, p. 436), the other representatives of this genus seem to be shallow-water species. *Trachyp. anchoralis* was taken by the "Siboga" at a depth of 141 m. at Stat. 153, but at Stat. 162 only in water of 18 m. *Trachyp. asper* was collected in water of 60 fathoms, but also between 20 and 35

fathoms. The new *Trachyp. salaco* was captured at both Stations in water of 22 m. and the atlantic *Trachyp. constrictus* is not known from more than 27 fathoms, while *Trachyp. similis* was taken at 1 to 2, but also at 31 fathoms.

Remarks. An examination of the single type specimen of *Penaeus barbatus* de Haan (Fauna Japonica, Crust. p. 192, Tab. XLVI, Fig. 3) from Japan, which specimen, kindly sent me by Dr. Horst of the Leyden Museum, is in a dry state, proved this species to be identical with *Penaeopsis akayebi* (Rathb.). In this specimen, which is about 65 mm. long, the rostrum is 6 + 1-dentate and reaches a little beyond the 2nd antennular article, while the epigastric tooth is situated at the anterior fourth of the carapace. The carina of the 3rd abdominal tergum slightly widens towards the posterior end and is flattened, though not grooved. I observe at either side of the carina of the 4th abdominal tergum, about 1,5 mm. distant from it, a longitudinal subcarina; these two subcarinae slightly diverge backward and are a little farther distant from the posterior than from the anterior margin of the somite. They are not mentioned in my description of *Pen. akayebi* (l. c. 1907, p. 433), but perhaps these subcarinae are a product of the desiccation. The carapace without the rostrum is 12 mm. long; the 6th abdominal somite, measured along the upper margin, appears to be 10,5 mm. long, it is 5,3 mm. wide (or high) anteriorly, 4,3 mm. posteriorly and 5,3 mm. in the middle. These numbers closely accord, as regards their proportions, with those which I have indicated, in the quoted paper, for *Pen. akayebi* (Rathb.).

The 1st legs are bispinose, the 2nd unispinose, but the 3rd seem to be unarmed, though de Haan describes "pedes tres antici basi unispinosi".

The stridulating organ fully agrees with that of *Pen. akayebi* (de Man, l. c. p. 434, Pl. XXXIII, Fig. 54) and is composed of 18—20 transverse ridges.

The specimen seems to be a male, but the petasma and the two last pairs of legs are lost.

† 38. *Trachypenaeus anchoralis* (Sp. Bate).

Penaeus anchoralis C. Spence Bate, Report Challenger Macrura, 1888, p. 258, Pl. XXXV, Fig. 1, 1′, 1″.

? *Penaeus granulosus* W. A. Haswell, Catal. Australian Stalk- and Sessile-eyed Crustacea, 1882, p. 202.

Stat. 51. April 19. Madura-bay and other localities in the southern part of Molo-strait. From 54—90 m. Fine grey sand; coarse sand with shells and stones. 1 young male and 2 young females.

Stat. 153. August 14. 0° 3′.8 N., 130° 24′.3 E. Halmaheira Sea. 141 m. Fine and coarse sand with dead shells. 1 young male.

Stat. 162. August 18. Between Loslos and Broken-islands, west coast of Salawatti. 18 m. Coarse and fine sand with clay and shells. 1 young male.

Stat. 289. January 20. 9° 0′.3 S., 126° 24′.5 E. Timor Sea. 112 m. Mud, sand and shells. 1 male of medium size.

The two adult females of *Trachyp. curvirostris* (Stimps.) from the Inland Sea of Japan, described by me in 1907 (Trans. Linn. Soc. London, Ser. 2. Zool. Vol. IX, p. 436, Pl. XXXIII, Fig. 56—58) are lying before me. Stimpson's species seems to be indeed different from that which was collected by the "Siboga" and which is perhaps identical with *Pen. granulosus* Hasw.

from Torres Strait; this question remains, however, undecided, especially because too little is known about the adult male of HASWELL's species, of which the petasma has not been described.

The largest of the four specimens is the male from Stat. 289, that is 69 mm. long. The rostrum, nearly horizontal above, reaches just beyond the 1st joint of the antennular peduncle and is armed with 10 teeth in addition to the epigastric tooth; the foremost tooth, the smallest of all, is situated close to the tip, being just as far distant from it as from the penultimate. The lower margin that rises obliquely upward, is straight, appears even very slightly concave in the middle. The subacute post-rostral carina reaches to the posterior margin of the carapace. Antero-inferior angle of the carapace rather obtuse.

The abdomen resembles that of the females from the Inland Sea of Japan, the pleura of the first somite show the same incision that runs from their lower margin upward, the carina on the tergum of the second somite is, however, longer and larger than in the japanese adult females of *Trachyp. curvirostris*.

The antennal flagella are, in the male from Stat. 289, 165 mm. long, a little more than twice as long as the body; the antennal scales just extend beyond the antennular peduncles. According to SPENCE BATE (l. c. p. 259), the scaphocerite should not extend "quite as far as the extremity of the peduncle of the 1st pair", but in his figure 1 the peduncle appears distinctly a trifle shorter. In the male from Stat. 289 the antennular peduncle is 11 mm. long, the flagella 9,5 mm.; in the largest of the three specimens from Stat. 51, a female long 64 mm., the flagella measure three-fourths the length of the peduncle, in the two other much younger specimens they are but little shorter than it.

The external maxillipeds reach, in the male from Stat. 289, just to the anterior third of the antennal scales, the legs of the 1st pair extend to the tip of the antennal peduncles, those of the 3rd pair reach with their fingers and the slender legs of the 5th pair with one-third of their propodi beyond the tips of the antennal scales. The legs of the 1st and of the 2nd pair are unispinose at base, those of the 3rd are unarmed. The thoracic legs closely resemble those of *Trachyp. asper* Alcock. The legs of the 4th and of the 5th pair are, however, distinctly more slender and longer than those of the adult females of *Trachyp. curvirostris* from the Inland Sea of Japan and it is therefore that I conclude that this species is another than that described by STIMPSON. In the japanese species the pereiopods of the 5th pair reach to the middle, but in the female, long 64 mm., from Stat. 51 almost to the tip of the antennal scales and in the still larger male from Stat. 289 they extend even with a part of their propodi beyond it.

The petasma of the male from Stat. 289 closely agrees with the figure 1″ in the Challenger Report, the two small submedian teeth do not project beyond the lateral lobes, different therefore from the petasma of *Trachyp. curvirostris*, in which they are figured as projecting beyond them (vide: K. KISHINOUYE, Journal Fisheries Bureau, VIII, N° 1, Tokyo, 1900, Pl. VII, Fig. 10). The petasma of *Trachyp. asper* Alcock has a quite different form (A. ALCOCK, Catal. Indian Decap. Crust. Calcutta 1906, Pl. IX, Fig. 28*a*).

The rostrum of the larger female from Stat. 51 is directed obliquely upward and reaches almost to the far end of the 2nd joint of the antennular peduncle; it bears 9 teeth, besides

the epigastric tooth, which is much smaller than the teeth on the middle of the rostrum. The lower margin, which, in the two other specimens from this Station, ascends in a curved line to the apex, appears here, as in the male from Stat. 289, very slightly concave in the middle. The post-rostral ridge is distinct until to the posterior margin of the carapace, but it is rather obtuse; in the two other specimens this ridge is less conspicuous. The rostrum of the young male that reaches as far as in the female, bears 8 teeth, but the other female also 9 besides the epigastric tooth.

The petasma of the young male, long 52 mm., is already developed; the thelycum of the larger female much resembles that of *Trachyp. curvirostris*, but the anterior cordiform plate is comparatively larger.

The male from Stat. 162 is 37 mm. long. The rostrum that reaches the end of the 1st joint of the antennular peduncle, bears 8 teeth besides the epigastric tooth and the lower margin is slightly concave as in the larger female from Stat. 51. The legs of the 5th pair reach the end of the scales and the two branches of the petasma are not yet united.

General distribution: Arafura Sea, South of Papua (Spence Bate). The specimens from Yokohama referred to this species in the Challenger Report probably belong to *Trachyp. curvirostris* (Stimps.).

†39. *Trachypenaeus salaco* de Man.

Trachypenaeus salaco J. G. de Man, in: Notes from the Leyden Museum, Vol. XXIX, 1907, p. 135.

Stat. 205. September 20. Lohio-bay, Buton-strait. 22 m. Sandy mud. 1 male.
Stat. 258. December 12/16. Tual-anchorage, Kei-islands. 22 m. Lithothamnion; sand and coral. 1 male.

Haswell's description of *Penaeus granulosus* from Torres Strait is applicable both to this species and to *Trachyp. anchoralis* (Sp. Bate), but without the examination of the type specimens it will be impossible to decide whether one of them is identical with it or not — and I therefore prefer to describe the Siboga specimens as a new species.

The male from Stat. 205 is the larger of the two and 42 mm. long, the carapace, with the rostrum, measures just one-third that length. Body more or less tomentose, especially the carapace, and both carapace and abdomen are very finely scabrous, being thickly covered with microscopical spinules, that are somewhat larger on the abdominal terga than on the carapace. The rostrum, the lower margin of which is slightly ascending, reaches just beyond the 1st joint of the antennular peduncle, not yet to the middle of the 2nd joint; it bears 8 teeth in addition to the epigastric tooth that is situated at the anterior fourth of the carapace. These teeth reach to the tip, become progressively smaller distally and the 1st is situated on the carapace; a line uniting the tips of the teeth runs almost horizontally. From the epigastric tooth which is much smaller than the 1st rostral tooth, a distinct though obtuse ridge runs backward to the posterior margin.

Supraorbital spine small, sharp; post-antennular spine of moderate size, hepatic spine a little smaller, antero-inferior angle of the carapace rectangular, obtuse; post-antennular groove

well marked, but the subhepatic ridge and the cervical groove are hardly discernible. The longitudinal fissure which in *Parapenaeopsis* and *Trachypenaeus* extends from the anterior border of the carapace backward seems to be wanting, but there is a short transverse suture at the level of the third legs.

Like the carapace, the abdomen resembles also closely that of *Trachyp. anchoralis* (Sp. Bate). As in this species the 2nd tergum carries a short carina in the middle, that measures one-fourth the length of that tergum, the 3rd—6th terga are carinate, except the anterior third of the 3rd tergum; the carina of the 6th ends in a tooth. Measured along their upper border, the carapace without the rostrum appears to be 9,5 mm. long, the fifth abdominal somite 3 mm., the sixth 5 mm. and the telson 5,75 mm.; the sixth somite is thus half as long as the carapace and slightly shorter than the telson. The telson that barely reaches beyond the middle of the inner uropod, fully agrees with that of *Trachyp. curvirostris* (Stimps.). (Vide: J. G. DE MAN, Trans. Linnean Soc. London, 1907, Pl. XXXIII, Fig. 58); the median groove is deep, though narrow and at either side of it there is another shallow groove that fades away backward. There are 4 small spinules on each lateral margin, arranged as in *Trachyp. curvirostris*; the posterior spine is larger than the three preceding, that easily may be overlooked, and perhaps this has been done by HASWELL when he described the telson of *Pen. granulosus* as having its lateral margins armed "with a single, weak spine". The pleura of the first somite show the same incision on their lower margin as in *Trachyp. anchoralis* and *Trachyp. curvirostris* (de Man, l. c. 1907, Fig. 57).

The upper antennae closely resemble those of *Trachyp. anchoralis*; their peduncle (7,5 mm.) is a little shorter than the carapace without the rostrum, the second joint appears, as in that species, comparatively shorter than in *Parapenaeopsis*, this joint being barely twice as long as the third; the barely longer, upper flagellum is just as long as the peduncle.

Antennal flagella twice as long as the body; scales as long as the antennular peduncles.

The external maxillipeds reach to the end of the 1st joint of antennular peduncle, i. e. to the anterior third of the antennal scales; they resemble, like the legs, closely those of *Trachyp. anchoralis.*

The legs of the 1st and of the 2nd pair bear a slender spine at the base, those of the 3rd are unarmed; the 3rd legs reach with their chelae beyond the scales and those of the 5th pair with their dactyli, the latter being just half as long as the propodi. All the thoracic legs are furnished with a large petaloid exopod, except the last pair, on which it is much smaller.

As is proved by the preceding, this new species bears a close resemblance to *Trachyp. anchoralis* (Sp. Bate), it differs, however, at first sight from this and the other species of *Trachypenaeus* by the petasma, that is symmetrical, 4 mm. long, not yet half as long as the carapace without the rostrum, and reaching to the coxae of the fourth pair of legs. The two branches are united on their anterior surface, but on the posterior they leave a narrow fissure between them, that widens a little towards the base; the stem ends distally in two large horns that are perpendicular to the stem and, suddenly narrowing, are curved inward, each horn ending in a mucronate tip, that is somewhat turned forward; the sharp, outer margin of each horn is, just above the curvature, slightly emarginate. From the transverse, anterior margin

of each horn a flattened, triangular lamina projects forward at an oblique angle with the level of the horns; as the tips of these plates are contiguous while their inner margins slightly diverge proximally, they leave a triangular interspace between them. In a lateral view the petasma appears somewhat convex just beneath the two triangular laminae, the proximal end of the stem is truncate; at the level of the posterior margin of the lateral horns, the margins of the median fissure on the posterior surface of the petasma carry each a small tooth, that one recognises the best when the petasma is looked at from above.

The sterna of the three anterior somites bear a small tooth in the middle.

The male from Stat. 258 is a little smaller, 37 mm. long, the carapace, rostrum included, being 13,25 mm. long. The rostrum is armed with 9 teeth in addition to the epigastric tooth, but for the rest resembles that of the other male. The petasma also resembles that of the other specimen, but the flattened, triangular laminae that project from the anterior border are not in contact with one another, but leave an interspace between them, their inner margins running parallel.

This species is remarkable because the pereiopods of the 1st and 2nd pair carry no epipod, this appendage being only present on the legs of the 3rd pair.

Parapenaeopsis W.-Mas.

The genus *Parapenaeopsis* comprises at present 10 or 11 species, that are all inhabitants of the Indopacific, no species having been observed in the Atlantic or even on the west coast of America. *Parap. cornuta* (Kish.) is distributed from Bombay and Singapore to Japan; it is one of the two species collected by the "Siboga", a female having been captured at the anchorage off Djangkar (Java). Closely related to this species, perhaps identical, is *Parap. maxillipedo* Alcock, recorded from Bombay, Madras and the Arakan coast. *Parap. sculptilis* (Heller) occurs not only on the west and on the east coast of India and in the Bay of Bengal (Mergui), but has also been taken at Penang, off the coast of Java, on the west coast of Borneo and at Hongkong; the variety *Hardwickii* Miers is with certainty known from the east coast of India, while the variety *cultrirostris* has been observed off the northern coast of the Bay of Bengal. *Parap. uncta* Alcock, *Parap. nana* Alcock and *Parap. acclivirostris* Alcock are forms occurring on the east coast of India, but the last species has also been taken in the Persian Gulf. *Parap. stylifera* (H. M.-Edw.) is known from the west coast of India and from Palk Strait, while the variety *coromandelica* Alcock occurs on the east coast. *Parap. gracillima* Nob. is only known from the coast of Sarawak, *Parap. Hungerfordi* only from Hongkong, and *Parap. tenella* (Sp. Bate), with which *Parap. crucifera* (Ortm.) is identical, occurs along the lower half of Japan, in the Bay of Kobé and in the Inland Sea of that country.

One new species was discovered by the "Siboga", *Parap. venusta*, captured on the east coast of the Aru Islands. Species of *Parapenaeopsis* have apparently not yet been observed in the Red Sea, in the western Indian Ocean and in the Central and South Pacific.

Of the majority of the species the bathymetrical distribution is unknown, but they seem to be inhabitants of shallow water. *Parap. cornuta* was captured by the "Siboga" at a depth of 9 meter and the new *Parap. venusta* in water of 13 m., the japanese *Parap. tenella* occurs

at 8 and between 5 and 20 fathoms, but *Parap. nana* was taken on the Orissa coast at a depth of 68 fathoms.

40. *Parapenaeopsis cornuta* (Kish.).

Penaeus cornutus K. Kishinouye, Journal Fisheries Bureau, Tokyo, VIII, N° 1, 1900, p. 23, Pl. VII, Fig. 9.
Parapenaeopsis cornutus G. Nobili, Bol. Mus. Zool. Torino, XVIII, 1903, N° 452, p. 6 and N° 455, p. 4.
? *Parapeneopsis maxillipedo* A. Alcock, Catal. Indian Decap. Crust. Part III. Macrura. Fasc. 1, Calcutta, 1906, p. 40, Pl. VIII, Fig. 24, 24*a*, *b*.

Stat. 4. March 9. 7°42′ S., 114°12′.6 E. Anchorage off Djangkar (Java). 9 m. Coarse sand. 1 female.

This specimen, which is 56 mm. long, is no doubt still young; it agrees very well with Alcock's description and figures of *Parap. maxillipedo*, but the legs of the third pair are unarmed at base and therefore it is referred to Kishinouye's species. The rostrum that reaches to the far end of the 2nd joint of the antennular peduncle, is slightly convex above the eyes and the acute tip is a little turned upward. It bears 9 teeth, of which the 1st or epigastric tooth is twice as far distant from the 2nd as the 2nd from the 3rd; the foremost tooth is a little farther distant from the tip than from the antepenultimate tooth. The post-rostral ridge is traceable until to the posterior margin of the carapace; midway between the latter and the epigastric tooth it is somewhat flattened and shows here a trace of a short shallow groove; posterior to this flattened part the ridge is much less distinct than in front of it. The longitudinal fissure runs as far as in *Parap. maxillipedo* and as in Kishinouye's figure, i. e. to the middle of the carapace, but he describes it as running about two-thirds the length of the latter. The 1st to 3rd abdominal somites are rounded, the carina of the 4th begins a little in front of the middle. Telson about as long as the 6th somite, considerably shorter than the inner uropod.

Outer antennular flagellum measuring two-thirds the length of the peduncle.

The external maxillipeds project with their terminal joint beyond the antennal peduncle. The 3rd thoracic legs reach to the middle of the antennal scale, while those of the 5th pair reach with their dactyli beyond the tip of the antennal peduncle. There is a spine at the base of the 1st and 2nd pair, but none on the 3rd and there are no epipods on the three last pairs of legs.

The thelycum fully resembles that of *Parap. maxillipedo* (Alcock, l. c. Fig. 24*b*), the tuft of hair posteriorly is also present. In Kishinouye's figure 9A the median plate appears a little too long.

General distribution: Bay of Ariake, Kūshū (Kishinouye); Bombay (Nobili); Singapore (Nobili).

†41. *Parapenaeopsis venusta* de Man.

Parapeneopsis venusta J. G. de Man, in: Notes from the Leyden Museum, Vol. XXIX, 1907, p. 134.

Stat. 273. December 23/26. Anchorage off Pulu Jedan, East coast of Aru-islands (Pearl-banks). 13 m. Sand and shells. 2 females.

A species of small size, unless the two specimens are not yet full-grown, for they are respectively only 39 and 37 mm. long. It belongs to that small section in which an epipod is present on the 2nd maxillipeds only. The carapace with the rostrum measures one-third the total length. Rostrum very short, reaching, just beyond the eyes, to the end of the 1st joint of the antennular peduncle; in addition to the epigastric tooth, the rostrum bears in one specimen 8, in the other 7 contiguous teeth, of which the 1st is situated on the carapace, the 2nd immediately before the frontal border, and which teeth reach to the tip. The characteristic form of the rostrum may be recognized from the figure; the rostral teeth progressively decrease in size towards the tip and a line uniting their tips curves regularly downward, while the tip is slightly upturned. Lateral ridge of the rostrum low, broad, regularly narrowing to the tip. The lower margin, which is fringed with long hairs, shows its greatest width between the 2nd and the 3rd tooth; it is emarginate at the base, while the rest appears slightly concave; the epigastric tooth, that is just as large as the 1st rostral tooth, is situated at the anterior third of the carapace. No post-rostral carina. Post-ocular tooth small, sharp. Post-antennular (antennal) tooth of moderate size, the buttress is little prominent and soon fades away backward; post-antennular groove shallow. The longitudinal fissure that runs from the frontal border of the carapace backward, is short, extending in one specimen as far as the epigastric tooth, in the other even only as far as the hepatic spine; the transverse suture, above the 3rd pair of legs, is also short. Hepatic spine a little smaller than the post-antennular spine. Antero-inferior angle of the carapace rectangular, obtuse, not spiniform or dentiform. As in *Parap. acclivirostris*, the subhepatic ridge stops far short of the antero-inferior angle. At either side of the epigastric tooth, also just behind the post-orbital tooth and furthermore in front of the subhepatic ridge and of the hepatic spine, the carapace appears tomentose, but for the rest it is smooth and glabrous like the abdomen.

The four anterior abdominal terga are rounded, not carinate, though the 4th somite is slightly compressed; 5th and 6th terga sharply carinate, the carina of the 6th ending in a small tooth. Sixth somite one and a half as long as the 5th, half as long as the carapace without the rostrum and just as long as the telson; the telson that extends a little beyond the middle of the inner uropods, is deeply grooved and ends rather acutely whereas the lateral margins bear each 4 small spinules, the posterior of which is somewhat larger than the preceding; the two posterior spinules are situated much nearer together than the two anterior.

The antennular peduncle (6,5 mm.), i. e. the distance between the frontal border of the carapace and the tip of the peduncle, is about half as long as the carapace, the rostrum included; the 3rd joint measures two-fifths of the 2nd; flagella subequal, the lower (5 mm.) being very little longer than the other, and a little shorter than the peduncle.

Antennal peduncle reaching as far as the eyes, a small spine at the infero-external angle of its basal joint; flagella lost, antennal scales as long as the antennular peduncle.

External maxillipeds hairy, stouter than the thoracic legs and reaching to the anterior fourth or fifth of the antennal scales; terminal joint measuring two-thirds the length of the penultimate.

The legs of the 1st pair extend to the middle of the antepenultimate joint of the outer

foot-jaws and are armed with a slender spine at the base; fingers one and a half as long as the palm. Of the following legs that seem to be unarmed at base, the 3rd extend to the middle of the terminal joint of the outer foot-jaws, almost just as far as the more slender legs of the 5th pair that reach but very little farther. The dactyli of the 4th pair measure three-fourths the length of the propodi and the propodi are little more than half as long as the carpal joints. The dactyli of the 5th pair are just half as long as the propodi; the carpi (4,4 mm.) are almost twice as long as the propodi (2,5 mm.).

The exopod of the 5th pair is a little smaller than those of the other legs.

The thelycum consists 1° of a posterior plate that is flattened on its outer surface and deeply notched anteriorly, 2° of a nearly semicircular, slightly concave, anterior plate, that terminates anteriorly in a sharp median tooth. The thelycum shows therefore in the middle a concavity.

Parapenaeopsis Hungerfordi Alcock from Hongkong differs by a much longer rostrum, by the stronger carination of the abdomen, by the form of the thelycum etc.

Penaeus Fabr.

The genus *Penaeus* Fabr. comprises at present about 20 species, 4 or 5 of which, however, are probably synonyms, besides 4 varieties; they are distributed through the Indopacific and the Atlantic, while one species occurs in the Mediterranean. The majority of the species are found in the tropical and subtropical seas.

P. caramote Risso inhabits the Adriatic and the Mediterranean, but occurs also on the west coast of Portugal and Spain and on the west coast of Africa, this species being known from Benguella. It is doubtful whether *P. caramote* occurs also on the south coast of England. Besides *P. caramote*, only two other species are found in the Atlantic. *P. brasiliensis* Latr. occurs along the east coast of America from New York to Brazil, but also in the east Atlantic: it has been observed at Whydah, St. Thomé, off the coast of Dahomey, Elmina and even in the lake Ahémé, that is situated 15 kilom. distant from the sea, with which it is in communication by a river. A variety *aztecus* Ives is known from Vera Cruz. The other, *P. setiferus* L., is distributed along the east coast of the United States, being known from Charleston, through the West Indies, to Brazil; it is often observed in large numbers at the mouth of the rivers of Florida.

About a dozen of species are found in the Indopacific. *P. canaliculatus*, described by Olivier one century ago in the Encyclopédie méthodique, constitutes with *P. brasiliensis* and three other indopacific species a section of the genus, in which the post-rostral carina is grooved and reaches almost to the posterior margin of the carapace, while the lateral rostral grooves extend just as far backward. *P. canaliculatus* and *P. brasiliensis* differ, however, from the three others by the telson bearing no lateral spinules. This *P. canaliculatus* is distributed from the Fiji Islands to the Gulf of Tedjourah near the Red Sea and is one of the 7 species that were taken by the "Siboga". Two other species of this section, viz. *P. japonicus* Sp. Bate and *P. latisulcatus* Kish., range from Japan to the Red Sea and both have been taken by the "Siboga" at various Stations; *P. japonicus* occurs also at the Fiji Islands and at Dar-es-Salaam,

as also along the coasts of India, but *P. latisulcatus* is not yet known from these coasts and its occurrence in the Red Sea appears still uncertain. The fourth indopacific species of this section, *P. plebejus* Hess, has still only been recorded from Sydney and Port Jackson, while the male is unknown.

P. semisulcatus de Haan is distributed from Japan, the Philippine Islands and New Guinea, along the coasts of India, to the Red Sea, where it has been observed at Djeddah and even at Suez; a variety *exsulcatus* Hilgd. is known from the coast of Mozambique. *P. carinatus* Dana, discovered at Singapore, was taken by the "Siboga" at Makassar and in the Java Sea, but this species ranges also from Karáchi, along the coasts of India, to the Andamans and Mergui and occurs even in the seas of Japan, though it is here a rare species. *P. indicus* H. M.-Edw. is distributed along the coasts of India from Karáchi and Bombay to Singapore; it is known from Quellimane and Dar-es-Salaam on the east coast of Africa, as also from Java and Amoy, but this species was not taken by the "Siboga". Instead of the typical species, however, the variety *longirostris*, described by me in 1892, was captured in the Bay of Bima and near Saleyer, while it was previously known from Makassar. This variety has not yet been observed outside of the East Indian Archipelago, as far as I am aware. Another variety of *P. indicus*, viz. *penicillatus* Alcock, is distributed from Karáchi and Bombay to Mergui. *P. merguiensis* de Man which previously was considered to be also a variety of *P. indicus*, was taken by this expedition in the Bay of Bima, off Makassar and on the west coast of New Guinea, but this species occurs also at the Philippine Islands, in the Bay of Bengal and along the coast of India as far as Bombay and Karáchi.

P. monodon (Fabr.) Alcock is known from Suez and occurs on the coasts of India to the Gulf of Martaban, but this species is probably identical with *P. semisulcatus*.

P. esculentus Hasw. is the common edible prawn of Sydney and the east coast of Australia; it seems to be closely related to *P. carinatus*, but to differ by its very short antennular flagella. *P. gracilirostris* Thallwitz is known from North Celebes, it is a rare species which mostly approaches to *P. semisulcatus* de Haan. *P. marginatus* Rand. is still only known from the Hawaiian Islands and the beautiful *P. coeruleus* Stebbing has still only been observed in the Nahoon river, which is tidal for several miles inland, near East London on the east coast of South Africa.

Seven species besides the variety *longirostris* of *P. indicus* are at present known to inhabit the East Indian Archipelago. *P. brevirostris* Kingsley occurs on the west coast of America from San Francisco Bay, California, to the Bay of Sechura, Peru and at the Galapagos Islands; it is the representative of *P. brasiliensis* Latr. from the Atlantic. *P. balboae* Fax. is also found on the west coast of Central America, and, finally, also *P. stylirostris* Stimps., with which *P. occidentalis* Streets from Panama is considered by Miss Rathbun to be identical, and which ranges from Panama to the north coast of Peru.

The species of *Penaeus* are littoral or sublittoral forms, though they descend sometimes to considerable depths. So e. g. *P. balboae* Fax. that was taken at a depth of 770 fathoms; *P. brasiliensis* is a littoral or sublittoral species, but it was captured by the "Blake" west of Tortugas, in water of 950 fathoms. *P. plebejus* Hess, with which *P. canaliculatus* (Oliv.), var.

australiensis Sp. Bate is identical, was observed by the "Challenger" at Port Jackson in water of 2—10 fathoms. Concerning *P. marginatus* Miss RATHBUN (U. S. Fish Commission Bulletin for 1903, Part III, Wash. 1906, p. 902) writes: "Large and mature specimens are found only in deep water, medium and smallish specimens are restricted to shallow water along shore, while the very young occur at the surface". About the vertical distribution of most other species little seems to be known.

† 42. *Penaeus semisulcatus* de Haan.

Penaeus semisulcatus W. de Haan, Fauna Japon. Crust. 1849, p. 191, Pl. XLVI, Fig. 1.
Penaeus semisulcatus J. G. de Man, in: Notes from the Leyden Museum, Vol. II, 1880, p. 185 and in: Max Weber's Zool. Ergebnisse II, 1892, p. 510 (partim) and in: Zool. Jahrb. X. Abth. f. Syst. 1898, p. 677.
Penaeus semisulcatus A. Ortmann, in: Zoolog. Jahrb. V. Abth. f. Syst. 1890, p. 450.
Penaeus monodon C. Spence Bate, Report Challenger Macrura, 1888, p. 250, Pl. XXXIV, Fig. 1.
? *Penaeus monodon* Th. R. R. Stebbing, South African Crustacea, Part III, 1905, p. 74.
? *Penaeus monodon* A. Alcock, Catal. Indian Decap. Crustacea. Part III. Macrura. Fasc. 1. Calcutta, 1906, p. 8, Pl. I, Fig. 1, 1*a*—*b*.
Penaeus ashiaka K. Kishinouye, in: Journal Fisheries Bureau, Tokyo, Vol. VIII, N° 1, 1900, p. 14, Pl. III and Pl. VII, Fig. 4, 4A, 4B.
Penaeus ashiaka M. J. Rathbun, in: Proc. U. S. Nat. Museum, Vol. XXVI, 1902, p. 38.
Penaeus ashiaka G. Nobili, in: Boll. Mus. Zool. Torino, N° 455, 1903, p. 2 and in: Bull. Scientif. France et Belgique, T. XI, 1906, p. 16.

Stat. 121. July 14/16. Menado-anchorage. 55 m. 1 young male and 1 young female.
Stat. 125. July 18/19. Anchorage off Sawan, Siau-island. 27 m. Stone and some Lithothamnion. 1 young male and 2 young females.
Stat. 213. September 26—October 26. Saleyer-anchorage and Surroundings. Coralreefs, mud and mud with sand. 1 male of medium size captured at a depth between 9 and 45 m. and 2 young males collected on the reef.
Stat. 299. January 27/29. 10° 52'.4 S., 123° 1'.1 E. Buka- or Cyrus-bay, South-coast of Rotti-island. Depth up to 20 m. Mud, coral and Lithothamnion. 1 young male.

I received from the Leyden Museum a type specimen of *Penaeus semisulcatus* de Haan, an almost adult female, long 170 mm., from Japan and furthermore the two females of medium size from Djeddah, Red Sea, referred by me (l. c. 1880, p. 185) to this species. The examination of these specimens led to the following conclusions: 1° that the "Siboga" specimens, mentioned above, belong to *P. semisulcatus* de Haan, 2° that the species described by Col. ALCOCK (l. c. 1906, p. 10, Pl. I, fig. 2) as *P. semisulcatus* de Haan, does not belong to this species, 3° that the species described by the same author as *P. monodon* Fabr. is very closely related to *P. semisulcatus* de Haan, if not identical, 4° that the species described by SPENCE BATE in the Report on the Challenger Macrura as *P. monodon*, belongs to *P. semisulcatus* de Haan, 5° that with DE HAAN's species *P. ashiaka* Kish. from Japan is identical and 6° that the two young females from Djeddah fully agree in all characters with the japanese type of *P. semisulcatus*.

In *P. semisulcatus* de Haan the pereiopods of the 5th pair are provided with a well developed exopod, that is somewhat smaller than the exopods of the preceding legs. As I already observed, the *P. monodon* of ALCOCK (l. c. 1906, p. 8) bears a close resemblance to

P. semisulcatus: the only differences seem to be the following. In ALCOCK's *monodon* the cervical groove, above the hepatic spine, appears in his figure 1 shorter than in *P. semisulcatus*, in which it extends upward to beyond the middle of the distance between the hepatic spine and the upper border of the carapace; in *P. semisulcatus* the ridge that, from the hepatic spine, above and parallel with the post-antennular crest, runs obliquely forward and upward, is rather long, much longer than in ALCOCK's figure 1 and in the description this ridge is also described by him as short. In the third place the petasma shows a somewhat different form. In the largest of the "Siboga" specimens, long 175 mm., from Stat. 213, the petasma closely resembles that of *P. ashiaka* Kish. (KISHINOUYE, l. c. Pl. VII, Fig. 4), which species is identical with *P. semisulcatus*; in ALCOCK's figure 1*a*, however, the distal extremity of the petasma appears concave and it ends proximally in one median process, in *P. semisulcatus*, on the contrary, in two lateral processes. For the rest his description of *P. monodon* perfectly well accords with the specimens of *P. semisulcatus* that are lying before me. As the japanese *P. semisulcatus* occurs not only in the East Indian Archipelago, but also in the Red Sea, as I already pointed out, this species no doubt also occurs in the Bay of Bengal and along the coasts of India, a reason the more for regarding ALCOCK's *monodon* as identical with the species of DE HAAN. In BATE's figure 1, that is a good figure of *P. semisulcatus*, the grooves and ridges on the sides of the carapace, anteriorly, have been quite exactly figured.

The male from Stat. 121 is 90 mm. long. The rostrum that reaches just beyond the tip of the antennular peduncle, projects straight forward and is $\frac{8}{3}$-dentate, the second lower tooth is implanted just below the foremost tooth of the upper margin as in figure 1 of ALCOCK's Monograph and the post-rostral carina is deeply grooved. The fourth abdominal somite is carinate in little more than half its length. The external maxillipeds reach to the middle of the antennal scale, while the third legs extend to the apex.

The female from the same Station is 85 mm. long. The rostrum, that reaches also just beyond the tip of the antennular peduncle, is $\frac{7}{3}$-dentate, its acute tip is slightly turned upward; the first or posterior tooth of the lower margin is situated just below the foremost tooth of the upper, so that two teeth of the lower margin stand in advance of the former. The fissure between the two lobes of the thelycum is still somewhat broader than in the adult female. In both specimens from Stat. 121 the flagella of the lower antennae show the beautiful coloration, characteristic of *P. ashiaka* (Kishinouye, l. c. Plate III), of which neither SPENCE BATE nor ALCOCK make mention.

The male from Siau Island is 76 mm. long. The rostrum fully resembles that of the female from Stat. 121, but it does hardly reach to the tip of the antennular peduncle. The larger female is 95 mm. long. The rostrum fully agrees with that of the male, but the tip is more clearly turned upward. The carina on the fourth abdominal somite extends only to the middle of the tergum. The rostrum of the other female, which is 52 mm. long, also resembles that of the male. The two lobes of the thelycum are here separated by a broad interspace. In these three specimens the coloration of the antennal flagella has faded away.

The rostrum of the largest male from Stat. 213 is straight, not at all upturned at its extremity, and hardly reaches beyond the penultimate joint of the antennular peduncle. The 7

teeth of the upper border closely resemble ALCOCK's figure 1 (l. c. 1906), but the lower margin bears four teeth of which three are implanted in advance of the foremost tooth of the upper margin, the first being just below that foremost tooth. The first tooth of the upper margin is placed a little more backward than in ALCOCK's figure, its place more agrees with Fig. 1 of the Challenger Report. The 4th abdominal somite is carinate in the two posterior thirds of the tergum. The three small, oblique ridges that are situated, as in other species, on the lateral surface of the 6th somite, the two on the 5th and the one on the 4th are wanting in ALCOCK's figure.

The antennular flagella are of equal length, 15 mm. long, considerably shorter than the distance (22 mm.) between the tip of the antennular peduncle and the frontal border of the carapace. The upper (outer) flagellum is widened almost along its proximal half and this dilated part, which is feebly grooved below, is 7 mm. long; though this widened portion seems somewhat to narrow distally when it is looked at from above, it does not regularly and gradually pass into the filiform distal part of the flagellum. In ALCOCK's figure 1 both flagella seem to taper regularly to their extremities. The third legs reach just beyond the tips of the antennal scales.

In the second male long 80 mm. and in the third long 74 mm. the rostrum shows the same characters as in the first, as regards the number and the arrangement of the teeth, except that the lower margin bears 3 teeth instead of 4; the rostrum of the youngest specimen extends just beyond the tip of the antennular peduncle and the distance (4,5 mm.) between the tip of the foremost upper tooth and that of the rostrum is one and a half as long as the distance between the tips of the 5th and of the 7th tooth. The antennal flagella of these three specimens have lost their coloration; in the male, long 105 mm., from Rotti-Island, however, the coloured rings are still visible. The rostrum of this specimen resembles that of the largest male from Stat. 213, but there are only 3, instead of 4, teeth on the lower margin. The carapace is 36 mm. long, rostrum included; the first upper tooth is 9 mm. distant from the anterior margin of the carapace and 11,5 mm. from the posterior.

In all the specimens collected by the "Siboga" the post-rostral carina is distinctly sulcate, the 1st pair of legs are bispinose, the 2nd unispinose, the 3rd are unarmed.

I may, finally, remark that in this species, different from *P. carinatus* (Dana) de Man, the subhepatic "crest" appears as a narrow, linear groove and hardly may be described as a crest.

Remarks. The main cause why *P. semisulcatus* de Haan has been so often confounded with the species described in this Report as *P. carinatus* Dana, is, in my opinion, the fact that DE HAAN's description is perfectly well applicable to both species.

The specimens from Makassar, referred by me (l. c. 1892, p. 510) to *P. semisulcatus*, proved, after a new examination, to belong partly to this species, partly viz. the adult specimens, to *P. carinatus* Dana. Also the young specimen from the Java Sea, described by me in another paper (l. c. 1898, p. 677) as *P. semisulcatus*, appeared, after a new examination, to belong indeed to this species.

With regard to *Penaeus caeruleus* Stebbing, in: South African Crustacea, Part III, Cape Town 1905, p. 77, Pl. XXI and XXIbis), I may add the following, having been kindly enabled by the Rev. STEBBING to examine one of the type specimens from Nahoon River near East

London, a young male long 70 mm., in which the two branches of the petasma are still separated and not yet fully developed. Except the fascinating blue colour, this specimen bore such a strong resemblance, even in minute particulars, to the two specimens of *P. semisulcatus* de Haan from Djeddah, Red Sea, that are lying before me, together with the adult type of this species from Japan, that one should be inclined to regard the species from Nahoon River merely as a variety of the common *P. semisulcatus*. Contrary to the Rev. STEBBING I observed a well developed exopod on both legs of the 5th pair, which is somewhat smaller than the exopods of the preceding legs. The specimen was not dissected by me so that I am unable to say whether the endopod of the first maxillae is indeed much more elongate than in DE HAAN's species, as suggested by the english carcinologist. The Rev. STEBBING drew my attention to the fact that the thelycum agrees with KISHINOUYE's figure for *P. ashiaka*, which is identical with *P. semisulcatus*, but that the shell of *P. caeruleus* is decidedly thin, while that of *P. ashiaka* is described by KISHINOUYE to be rather thick.

I will finally add that, according to this japanese author, *P. ashiaka* has a greyish brown or bluish colour.

General distribution: Japan (DE HAAN, ORTMANN, KISHINOUYE, RATHBUN); off Panay, Philippine Islands (SPENCE BATE); South of New Guinea (SPENCE BATE); Java Sea (DE MAN); Makassar (DE MAN); Singapore (ORTMANN, NOBILI); Orissa and Ganjam, off Indus Delta, Gulf of Martaban, off Pulicat (Madras), Madras and Pondichery, Suez (ALCOCK, when, as I suppose, this author's *P. monodon* is indeed identical with this species); Djeddah, Red Sea (DE MAN); Aden (NOBILI).

43. *Penaeus gracilirostris* Thallw.

Penaeus gracilirostris J. Thallwitz, Decapoden-Studien, Berlin 1891, p. 3, Fig. 5.

Though this species was not collected by the "Siboga", the following observations will, I suppose, be welcome. By the courtesy of Prof. K. M. HELLER of the Royal Zoological Museum at Dresden, I was enabled to examine the single type specimen of *Penaeus gracilirostris* Thallw. from North Celebes. This species has been quite well described, but, as regards the figure, I wish to remark that not the 3rd, but the 4th tooth of the upper margin of the rostrum is placed above the orbital margin of the carapace, because, as is stated in the description, the three first teeth are situated on the carapace. The distance between the two teeth of the lower margin appears in the figure a little too long when compared with the distance between the anterior tooth of the lower margin and the tip of the rostrum: in the type specimen, indeed, the latter distance appears decidedly longer than the interspace between the two teeth. The rostrum appears, between the teeth of the lower margin, distinctly higher than just beyond the anterior tooth, because the rostrum regularly narrows towards the tip in a lateral view, but this is not the case in the figure. Finally, the lateral rostral carinae that are a continuation of the distal unarmed part of the upper margin, though distinctly extending behind the first tooth, do not reach as far backward as the cervical groove, while they do so in the figure.

This species now mostly approaches to *P. semisulcatus* de Haan, that also occurs in the

seas of North Celebes, but it is distinguished by the following specific characters: The different shape and characteristic toothing of the rostrum, that has a more slender form, while the teeth of the upper margin are smaller, i. e. less high than in *P. semisulcatus*. The post-rostral crest is not grooved. Both in *P. semisulcatus* and in this species the lateral rostral carinae extend a short way beyond the first tooth, different from *P. carinatus* Dana, but in *P. semisulcatus* they reach farther backward than the cervical groove, whereas in *P. gracilirostris* the latter extends a little farther backward than the lateral carinae. In *P. semisulcatus* the upper half of the cervical groove is straight, directed obliquely upward, with the upper extremity situated just below the tip or at most below the free part of the first tooth, the groove presenting only one posterior curve; in *P. gracilirostris*, however, the cervical groove has a S-like form, because the upper half is not straight, but curved backward, and the upper extremity is situated far behind the 1st tooth, that is distinctly indicated in the figure. The ridge that defines the antennal groove above, is just as long as in *P. semisulcatus* and the subhepatic crest, which is quite straight in the species of DE HAAN, appears, in *P. gracilirostris*, very slightly arcuate, which is also visible in the figure. In both species the 5th legs bear a small exopod, much smaller than those of the preceding legs, but the 4th and the 5th legs, especially the carpal joints, show a somewhat more slender form in *P. gracilirostris*.

The type specimen is a young male, in which the two branches of the petasma are not yet quite developed and not yet united. Probably the petasma and the thelycum, like also the oral appendages, will show still other differences.

P. gracilirostris Thallw. seems to be a rare species, for it is still only known by one single specimen!

44. *Penaeus carinatus* Dana.

Penaeus carinatus J. D. Dana, U. S. Explor. Exped. Crustacea, p. 602, Pl. 40, Fig. 2.
Penaeus semisulcatus J. G. de Man, in: Journal Linnean Soc. London, Vol. XXII, 1888, p. 284 and in: Max Weber's Zool. Ergebn. 1892, p. 510 (partim).
Penaeus monodon J. R. Henderson, A Contribution to Indian Carcinology, London, 1893, p. 447.
Penaeus monodon J. G. de Man, in: Zool. Jahrb. X. Abth. f. Syst. 1898, p. 677. (the specimens examined).
Penaeus monodon K. Kishinouye, in: Journal Fisheries Bureau, Vol. VIII, N° 1, Tokyo, 1900, p. 15, Pl. II, Fig. 1 and Pl. VII, Fig. 3, 3 A.
Penaeus monodon G. Nobili, in: Boll. Mus. Zool. Torino, N° 452, 1903, p. 1 and N° 455, 1903, p. 1.
Penaeus semisulcatus A. Alcock, Catal. Indian Decap. Crustacea. Part III. Macrura. Fasc. 1, Calcutta, 1906, p. 10, Pl. I, Fig. 2.

Stat. 71. May 10—June 7. Makassar. Depth up to 32 m. Mud. Sand with mud. Coral. 4 adult females.
Stat. 323. February 24/25. Sangkapoera-roads, Bawean-island. 12 m. Mud. 1 young male.

These specimens certainly belong to the species which in Col. ALCOCK's valuable Monograph of the Indian Prawns of the *Peneus* group has been described as *P. semisulcatus* de Haan, — erroneously, however, as I pointed out on p. 97. In the present species there is no trace of an exopod on the 5th legs, while in *P. semisulcatus* de Haan these legs bear a well developed

exopod, somewhat smaller than those of the preceding legs. It seems to me probable that the seas of India and of the East Indian Archipelago are inhabited only by two or three species of *Penaeus*, in which the rostrum is $\frac{7-8}{3}$-dentate, in which the post-rostral carina is more or less distinctly sulcate and much longer than the lateral grooves and the carapace of which bears a subhepatic crest. These species are 1^0 *P. semisulcatus* de Haan, 2^0 the present species and 3^0 the species described by ALCOCK (l. c. 1906, p. 8) as *P. monodon*, at least when this form should prove to be indeed different from *P. semisulcatus* de Haan. It is therefore that I don't describe the present species as *P. monodon*, but, as for me, it may afterwards be rebaptized with this name, as soon as the identity of ALCOCK's *monodon* with *P. semisulcatus* will be demonstrated.

P. carinatus Dana is a species also of a large size, that attains the length of at least a foot and that occurs at Singapore. The carapace and the rostrum, as figured by DANA, fully resemble the present species and the lateral rostral grooves do not reach backward to the 1st tooth of the rostrum, a character by which *P. carinatus* Dana is distinguished both from *P. semisulcatus* de Haan and from ALCOCK's *P. monodon*; in the present species the rostral grooves extend just as far backward as in DANA's figure. According to this author the flagella of the inner antennae should not be longer than the two preceding joints; the REV. STEBBING, however, remarks with regard to this description: "as DANA omits these antennae altogether from his figure of the carapace, we cannot be very sure that he knew much about them". (South African Crust. Part III, 1905, p. 75).

For all these reasons I prefer to describe the present species as *P. carinatus* Dana, instead of creating a new name again. The principal characters of this species have been already indicated by ALCOCK. Three of the four females from Makassar are 23—24 cm. long. In two females the rostrum is $\frac{8}{3}$-dentate, in both the 2nd lower tooth is situated just below the interspace between the 7th and the 8th tooth of the upper border and in both the 3rd tooth of the lower margin stands in advance of the foremost upper tooth; in the third female, long 23,5 cm., the formula is $\frac{7}{3}$, the 1st lower tooth is implanted opposite the interspace between the 6th and the 7th tooth of the upper margin and the two following teeth of the lower margin are in advance of the foremost upper tooth. The post-rostral carina of this female is distinctly grooved; in one of the two preceding females the groove is only developed on its posterior half and in the third the carina shows here only a few impressed pits. The fourth female is 190 mm. long. The rostrum bears 7 teeth above, the lower margin only two, the posterior of which is situated just behind the foremost tooth of the upper border, the anterior just in advance of it; the 3rd tooth of the lower margin is perhaps broken off and in regeneration, for one observes here a low rounded prominence. The post-rostral carina bears a well developed though shallow groove.

The antennular flagella are subequal; the upper (outer) flagellum is, in the four females, distinctly longer than the peduncle, i. e. the distance between its tip and the anterior border of the carapace; in the much younger male from Stat. 323 they are, however, shorter than the peduncle, that measures 20 mm., for they are here 17 or 18 mm. long, a difference caused by the younger age of this specimen. The rostrum is $\frac{7}{3}$-dentate, two teeth of the lower border are in advance of the foremost upper tooth; post-rostral groove shallow.

Remark. The *Penaeus monodon* of KISHINOUYE is no doubt identical with this species. The male from Stat. 323 closely resembles Fig. 1 of Plate II of KISHINOUYE's paper, except only the coloured rings of the antennal flagella which in this specimen are not visible.

General distribution: Tokyo Bay and Bay of Ise, Japan, rare (KISHINOUYE); Makassar (DE MAN); Atjeh (DE MAN); Singapore (DANA, NOBILI); Mergui (DE MAN, ALCOCK); all round the coasts of India and Ceylon from Karáchi to Mergui and the Andamans (ALCOCK). It is the commonest salt-water prawn of the Calcutta market (ALCOCK).

†45. *Penaeus indicus* H. Milne-Edw., var. *longirostris* de Man.

Penaeus indicus H. Milne-Edw., var. *longirostris* J. G. de Man, in: Max Weber's Zoolog. Ergebn. II, 1892, p. 511, Pl. XXIX, Fig. 53.
Confer also: A. ALCOCK, Catal. Indian Decap. Crust., Part III. Macrura. Fasc. 1. Calcutta, 1906, p. 12.

Stat. 47. April 8/12. Bay of Bima. Shore. 6 specimens.
Stat. 213. September 26—October 26. Saleyer-anchorage and Surroundings. Depth up to 36 m. Coralreefs, mud and mud with sand. 5 females.

The type specimen of this variety, a young male from Makassar, preserved in the Zoological Museum of the University of Amsterdam, was again examined and the specimens, collected by the "Siboga", proved to belong to it.

According to ALCOCK, who (l. c.) has first clearly characterized *P. indicus*, the rostrum "projects in young individuals far beyond the tip of the antennal scale, whereas in adults it is often not longer than that of *monodon*". The five females from Saleyer are adult, but their rostrum is comparatively as long as in young individuals and their carapace fully resembles ALCOCK's figure 3*a*. For the rest these specimens fully agree with his description and figures.

The largest female is 165 mm. long, the youngest 125 mm. In all these specimens the rostrum projects with one third to two fifth parts of its free portion beyond the antennal scales and in all it is more or less strongly curved upward. The rostrum of the youngest female is more strongly curved upward than that of the other specimens and $\frac{7}{5}$-dentate; the foremost tooth of the upper margin, situated just above the second of the lower, is a little more distant from the tip of the rostrum than from the frontal border of the carapace. The rostrum of the four other specimens is $\frac{8}{6}$-dentate; in two the foremost tooth of the upper border is still a little farther distant from the tip than from the frontal margin, but in the largest female the foremost tooth, implanted just above the third of the lower, appears slightly farther distant from the frontal margin than from the tip of the rostrum. In all the five females 3 teeth are on the carapace and in all the groove on either side of the rostrum ends beside the 1st (epigastric) tooth. As regards the height of the rostral crest, these specimens are quite typical. The post-rostral carina, though not grooved, shows usually two or three shallow pits.

In the largest individual the upper (outer) antennular flagellum, measuring 33 mm.,

appears a little more than one and a half as long as the peduncle, i. e. as the distance (21 mm.) between its tip and the frontal margin of the carapace; the basal portion of this flagellum, broadened and furrowed both in the male and in the female, is 9 mm. long, almost one-third its length; the other flagellum is one-fourth shorter. The antennular flagella are apparently longer than those of *P. merguiensis* de Man.

The flagella of the outer antennae seem to be a little shorter than those of *P. merguiensis*: the flagellum of a female long 140 mm. of the variety *longirostris* measures 185 mm., but in a female of the same size of *P. merguiensis* it is 225 mm. long. The external maxillipeds of the largest specimen reach as far forward as the antepenultimate joint of the antennular peduncle, i. e. to the middle of the antennal scale; as no male was collected, I cannot say whether the dactylus shows the same characters as in the typical *P. indicus*. The legs of the 1st pair reach with their fingers beyond the tip of the antennal peduncle, those of the 2nd extend almost to the distal end of the penultimate joint of the antennular peduncle, whereas the 3rd legs reach with their fingers beyond the end of this peduncle. The legs perfectly well agree, as regards their form, with ALCOCK's figure 3 [1]).

The 6 specimens, males and females, from the Bay of Bima, are all young; they were taken together with specimens of *P. merguiensis* de Man. The largest is a female long 105 mm. The rostrum, distinctly curved upward, projects with one-third of its free portion beyond the antennal scales and is $\frac{8}{6}$ dentate; the foremost tooth, situated opposite the base of the 4th lower tooth, is but little farther distant from the anterior margin of the carapace than from the tip of the rostrum; the foremost tooth of the lower margin is much smaller than the preceding and stands near the tip, this tooth being almost 3-times as far distant from the 5th as from the extremity of the rostrum.

The rostrum of a younger female, long 80 mm., projects with two-fifths of its free portion beyond the scales, is distinctly turned upward and also $\frac{8}{6}$-dentate; the foremost tooth of the upper margin, situated opposite the 3rd of the lower, is a trifle farther distant from the tip of the rostrum than from the frontal margin of the carapace. In a young male the rostrum is $\frac{9}{6}$-dentate and the 4th tooth of the lower margin is situated just in advance of the most anterior tooth of the upper. The formulae of the three other specimens are $\frac{8}{7}$, $\frac{7}{7}$ and $\frac{7}{6}$.

General distribution: Makassar (DE MAN).

†46. *Penaeus merguiensis* de Man.

Penaeus merguiensis J. G. de Man, Journal Linn. Soc. Zool. XXII, 1888, p. 287, Pl. 18, Fig. 8.
Penaeus indicus C. Spence Bate, Report Challenger Macrura, 1888, p. 248, Pl. XXXIII, Fig. 2.
Penaeus indicus J. G. de Man, in: Max Weber's Zool. Ergebn. II, 1892, p. 511 (partim) and in: Zool. Jahrb. X. Abth. f. Syst. 1898, p. 680.
Penaeus indicus, var. *merguiensis* A. Alcock, Ann. Mag. Nat. Hist. (7) XVI, 1905, p. 515 and Catal. Indian Decap. Crust. Part III. Macrura. Fasc. 1. Calcutta, 1906, p. 13, Pl. II, Fig. 4.

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1) In SPENCE BATE's figure of the type specimen of *P. indicus* in the Paris Museum (in: Ann. Mag. Nat. Hist. (5) VIII, 1881, p. 177, Pl. XII, Fig. 5) the thoracic legs show a more slender appearance than those of the "Siboga" specimens or than in ALCOCK's figure 3. BATE's figure is therefore probably inaccurate.

Stat. 47. April 8/12. Bay of Bima. Shore. 11 specimens, mostly females.
Stat. 71. May 10—June 7. Makassar. Depth up to 32 m. Mud. Sand with mud. Coral. 15 males and 10 females.
Stat. 169. August 23/25. Anchorage off Atjatuning, West-coast of New Guinea. Reef. 1 female.

Penaeus merguiensis, which in 1892 was identified by me with *P. indicus*, ought, no doubt, to be considered as a distinct species. When adult specimens of *P. merguiensis* are compared with the adult females of *P. indicus* var. *longirostris* de Man from Saleyer, described p. 103, their outer appearance is so greatly different, especially as regards the shape of the rostrum that every one will consider them as different species. But even the typical form of *P. indicus* (Alcock, l. c. 1906, Fig. 3) differs, like also the variety *longirostris*, by the distinctly less slender form of the chelate thoracic legs. Adult males of *P. merguiensis* are moreover distinguished by the dactylus of the external maxillipeds being only half as long as the propodus.

The largest specimen from Stat. 47 is a female long 135 mm. The rostrum projects straight forward, is as long as the antennal scales and $\frac{7}{4}$-dentate; the distance between the foremost tooth of the upper margin and the tip of the rostrum is more than one and a half as long as the distance between this tooth and the penultimate. The rostrum of three other somewhat younger females is $\frac{8}{5}$-dentate, of another $\frac{8}{4}$ and of a sixth again $\frac{7}{4}$. In the other still younger individuals the rostrum is somewhat curved upward and projects a little beyond the antennal scales; in two of them the rostrum is $\frac{8}{5}$-dentate, in three other ones $\frac{8}{6}$, $\frac{7}{6}$ and $\frac{7}{5}$.

The largest male from Makassar is 130 mm. long, the largest female 140 mm. The rostrum of two large males is $\frac{8}{5}$-dentate, of three other ones $\frac{7}{4}$; in three large females the formula is also $\frac{7}{4}$, in four other ones $\frac{8}{5}$, $\frac{7}{5}$, $\frac{7}{3}$ and $\frac{6}{4}$. In a young female, long 70 mm., from Makassar the rostrum projects beyond the scales, is slightly curved upward and $\frac{8}{5}$-dentate; the foremost tooth of the upper border is one and a half times farther distant from the tip of the rostrum than from the preceding tooth. In other very young individuals the rostrum bears 7—8 teeth above, 5—6 below.

In young individuals both of *P. indicus* and of *P. merguiensis* the rostrum projects beyond the antennal scales and is more or less conspicuously curved upward; in many cases these young specimens may, however, be distinguished by the teeth of the upper margin, which in *P. merguiensis* usually occur till near the tip, while in *P. indicus* the foremost tooth is situated opposite the terminal joint of the antennular peduncle, so that the distal unarmed part of the upper border appears comparatively longer (vide DE MAN, l. c. 1892, Pl. XXIX, Fig. 53 and ALCOCK, l. c. 1906, Fig. 3*a*).

The female from Stat. 169 is 105 mm. long; the rostrum projects still somewhat beyond the scales, is slightly curved upward and $\frac{7}{4}$-dentate; the foremost tooth of the upper margin, situated just above the third of the lower, is little farther distant from the tip of the rostrum than from the preceding tooth.

The male described and figured in the Report on the Challenger Macrura as *P. indicus* seems to belong to *P. merguiensis*.

General distribution: Makassar (DE MAN); Philippine Islands (SPENCE BATE); Java Sea (DE MAN); Mergui (DE MAN); Karáchi, Bombay, Palk Strait, Orissa and Ganjam, Hooghly Delta (ALCOCK).

†47. *Penaeus canaliculatus* Oliv.

Penaeus canaliculatus A. G. Olivier, Encyclop. Méthod. 1811, p. 660.
Penaeus canaliculatus H. Milne-Edwards, Hist. Nat. Crust. II, 1837, p. 414.
Penaeus canaliculatus C. Spence Bate, in: Ann. Mag. Nat. Hist. (5) Vol. 8, 1881, p. 174 and Report Challenger Macrura, 1888, p. 243, Pl. XXXII, Fig. 1 and 2.
Penaeus canaliculatus G. Nobili, in: Ann. Scienc. Nat. Zoologie. 9e Sér. T. IV, 1906, p. 9.
Nec: *Penaeus canaliculatus* W. de Haan, Fauna Japon. Crust. 1849, p. 190.
Nec: *Penaeus canaliculatus* E. J. Miers, in: Proc. Zool. Soc. 1878, p. 298 and Report Voyage of H. M. S. "Alert", 1884, p. 563.
Nec: *Penaeus canaliculatus* K. Kishinouye, in: Journal Fisheries Bureau, Vol. VIII, N° 1, Tokyo, 1900, p. 11, Pl. I and Pl. VII, Fig. 1.
Nec: *Penaeus canaliculatus* A. Alcock, Catal. Indian Decap. Crust. Part III. Macrura. Fasc. 1, Calcutta, 1906, p. 14, Pl. II, Fig. 6, 6*a*—*c*.

Stat. 131. July 24/25. Anchorage off Beo, Karakelang-islands. 13 m. Mud and sand. 1 female.
Stat. 133. July 25/27. Anchorage off Lirung, Salibabu-island. Depth up to 36 m. Mud and hard sand. 1 male and 2 females.
Stat. 179. September 2/3. Kawa-bay, west coast of Ceram. Reef. 1 male and 4 females.

All these specimens belong to the typical species, characterized by the telson bearing no spinules on its lateral margins. The female from Stat. 131 is 92 mm. long. The rostrum that reaches to the end of the antennular peduncle is $\frac{11}{1}$-dentate; four teeth are on the carapace, the 1st is one and a half as far distant from the 2nd as the 2nd from the 3rd; the ventral tooth is situated just below the interspace between the two foremost teeth of the upper border. Dorsal median groove of the carapace much narrower than the lateral ones. External maxillipeds reaching to the end of the antepenultimate joint, the 3rd legs to that of the terminal joint of the antennular peduncle. The fingers of the 3rd legs are not longer than the palm.

The male from Stat. 133 is 88 mm. long. The rostrum that reaches to the tip of the antennular peduncle, is $\frac{10}{1}$-dentate and agrees with that of the preceding female. The legs of the 3rd pair reach to the end of the penultimate joint of the antennular peduncle. The larger female of this Station is 137 mm. long, whereas the specimens of H. Milne Edwards from the Mauritius measured 125 mm. Unfortunately the tip of the rostrum is broken, but it resembles, no doubt, the preceding specimens; four teeth are on the carapace and the 1st is one and a half as far distant from the 2nd as the 2nd from the 3rd. The distance (20 mm.) between the tip of the posterior spine and the posterior margin of the carapace is twice as long as the distance (9,5 mm.) in front of it, measured to the orbital margin. The groove of the post-rostral carina is much narrower than the lateral furrows. The sixth abdominal somite is 14,5 mm. long, measured along its upper border and 12 mm. wide; the telson is 16 mm. long.

As regards the length of the external maxillipeds and of the third legs this female agrees with that from Stat. 131; the fingers of these legs are slightly shorter than the palm.

The other female is 60 mm. long; rostrum $\frac{10}{1}$-dentate. The thelycum shows another form than in the adult; the lateral plates or lobes are not in contact with one another, but separated by an interspace as broad as the plates. The external maxillipeds and the third legs are slightly shorter than in the preceding specimens.

The male from Kawa-bay is very young, its rostrum is broken, the four females are

larger, though not yet adult: the largest is 106 mm. long. The rostrum of this female is as long as the antennular peduncle and $\frac{10}{1}$-dentate; the 1st tooth is almost twice as far distant from the 2nd as the 2nd from the 3rd. The three other females gradually decrease in size, the formulae of their rostrum are in the two larger $\frac{9}{1}$, in the youngest $\frac{10}{1}$.

Remarks. Some years ago I have described two females of this species, captured at Amboina by the late Dr. Brock, in which the post-rostral carina was not grooved and in which the first legs were bispinose (in: Archiv. f. Naturg. 53er Jahrg. 1888, p. 565). Probably an individual variety.

General distribution: Fiji Islands (Spence Bate); Celebes and Mauritius (H. Milne-Edwards); Gulf of Tedjourah, Red Sea (Nobili).

48. *Penaeus japonicus* Sp. Bate.

Penaeus canaliculatus Oliv., var. *japonicus* C. Spence Bate, Report Challenger Macrura, 1888, p. 245, Pls. XXXI, XXXII, Fig. 4, XXXVII, Fig. 2.
Penaeus canaliculatus Oliv., var. *japonicus* A. Alcock, in: Ann. Mag. Nat. Hist. (7) XVI, 1905, p. 514.
Penaeus canaliculatus A. Ortmann, in: Zool. Jahrb. V. Abth. f. Syst. 1890, p. 448, Pl. XXXVI, Fig. 2*a*, *b*.
Penaeus canaliculatus K. Kishinouye, in: Journal Fisheries Bureau, Vol. VIII, N° 1, Tokyo, 1900, p. 6, 11, Pl. I and Pl. VII, Fig. 1, 1A—1C.
Penaeus canaliculatus M. J. Rathbun, in: Proc. U. S. Nat. Mus. XXVI, 1902, p. 37.
Penaeus canaliculatus A. Alcock, Catal. Indian Decap. Crust. III. Macrura. Fasc. 1. Calcutta, 1906, p. 14, Pl. II, Fig. 6*a*—*c*.
Penaeus japonicus G. Nobili, in: Annal. Scienc. Natur. 9e Sér. T. IV, 1906, p. 10.

Stat. 16. March 15/16. 6° 59′ S., 115° 24′.7 E. Bay of Kankamaraän, S. coast of Kangeang. 22 m. Mud. 1 very young male.
Stat. 131. July 24/25. Anchorage off Beo, Karakelang-islands. 13 m. Mud and sand. 2 females.
Stat. 296. January 24/26. 10° 14′ S., 124° 5′.5 E. Noimini Bay, South coast of Timor. Reef. 1 young male.
Stat. 323. February 24/25. Sangkapoera-roads, Bawean-island. 12 m. Mud. 2 young males.
Postillon-islands. 1 female presented by Mr. Jacquin of Makassar.

The specimens are of medium size or very young.

The male from Stat. 16 is 34,5 mm. long, the youngest of all. The rostrum that reaches to the middle of the penultimate joint of the antennular peduncle, is $\frac{12}{1}$-dentate; five teeth are on the carapace, the 1st is almost twice as far distant from the 2nd as the 2nd from the 3rd. The post-rostral carina is flattened, but not yet grooved; the lateral grooves are, however, distinct and extend as far backward as in the adult. According to Miss Rathbun, in young specimens of the closely related *P. marginatus* Rand., a species that inhabits the coasts of the Hawaiian Islands, the median carina and the lateral grooves fade out before reaching as far back as in the adult. (Vide: U. S. Fish Commission Bull. for 1903, Pl. III, Wash. 1906, p. 902). The fourth abdominal somite is still rounded posteriorly.

The two females from Stat. 131 are of equal size and 110 mm. long. The rostrum just as long as the antennular peduncle in one specimen and slightly reaching beyond it in the other, is $\frac{10}{1}$-dentate in the former and $\frac{11}{1}$ in the latter. In both specimens four teeth are on the

carapace, the 5th situated just above the orbital margin. The post-rostral carina is deeply grooved and this groove is much narrower than the lateral furrows. The telson just as long as the sixth somite terminates in this species more acutely than in *P. canaliculatus* Oliv.

P. japonicus also differs from *P. canaliculatus* by the fingers of the chelate legs that are somewhat longer in proportion to the palm, so that those of the 3rd pair are noticeably longer than it. In the very young male from Stat. 16 the fingers are, however, still a trifle shorter than the palm.

The thelycum agrees with ALCOCK's figure 6*c* (l. c.).

The female from the Postillon-islands has the same size as the preceding and agrees with them.

The young male from the South coast of Timor is 62 mm. long. The rostrum is $\frac{9}{1}$-dentate, four teeth are on the carapace. The groove of the post-rostral carina is still quite shallow and, in the middle, even wanting at all. Fingers of the third legs distinctly longer than the palm.

The larger male from Bawean-island measures 80 mm., the other is a little smaller. In both the rostrum is $\frac{11}{1}$-dentate, and the 5th tooth stands above the orbital margin. The fingers of the chelate legs agree with those of the female.

According to KISHINOUYE *P. japonicus* attains a length of 27 cm.

General distribution: Japan (SPENCE BATE, ORTMANN, KISHINOUYE, RATHBUN, ALCOCK); Loo Choo Islands, Amami Oshima (ORTMANN); Amboina (ORTMANN); Fiji Islands, Orissa coast, Andamans, Hooghly Delta, off Indus Delta (ALCOCK); Dar-es-Salaam (ORTMANN); Red Sea (NOBILI).

†49. *Penaeus latisulcatus* Kish.

Penaeus latisulcatus K. Kishinouye, in: Journal Fisheries Bureau, Vol. VIII, N° 1, Tokyo, 1900, p. 12, Pl. II, Fig. 2 and Pl. VII, Fig. 2.
Penaeus latisulcatus M. J. Rathbun, Proc. U. S. Nat. Mus. Vol. XXVI, 1902, p. 37.
Penaeus canaliculatus J. G. de Man, in: Notes from the Leyden Museum, Vol. II, 1880, p. 185 (the specimen examined).
Penaeus canaliculatus Oliv., var. ?, W. F. Lanchester, in: Proc. Zool. Soc. London, 1901, p. 571, Pl. XXXIV, Fig. 5.
Penaeus canaliculatus Oliv., var. *australiensis* J. G. de Man, in: Abhandl. Senckenb. Naturforsch. Gesells. Bd. XXV, 1902, p. 905 (the specimen examined). (nec: *Penaeus canaliculatus* Oliv., var. *australiensis* C. Spence Bate, Report Challenger Macrura, 1888, p. 248, Pl. XXXII, Fig. 3).

Stat. 179. September 2/3. Kawa-bay, West coast of Ceram. Reef. 5 males and 4 females.
Stat. 213. September 26—October 26. Saleyer-anchorage and Surroundings, including Pulu Pasi Tanette, near the North-point of Saleyer-island. Reef. 1 young female.
Stat. 234. November 19/20. Nalahia-bay, Nusa-Laut-island. 46 m. Stony bottom. 1 female.
Stat. 248. December 4/5. Anchorage off Rumah Lusi, North-point of Tiur-island. Reef. 1 very young female.

Through the courtesy of Professor EHLERS I received from the Museum of Göttingen the type specimen of *Penaeus plebejus* Hess, described by W. HESS in his "Doctor-Dissertation", entitled "Beiträge zur Kenntniss der Decapoden-Krebse Ost-Australiens. Bonn, 1865". Together with this specimen, an adult female, from Sydney, I received from the same Museum another

female, almost of the same size, and collected on the coast of Japan; this specimen has also been referred by HESS to his *P. plebejus*. The two females bear such a strong resemblance to one another, even as regards their thelycum, that they were considered also by me to belong to one and the same species when I had the opportunity to study these females in 1888 (vide: Zoolog. Jahrb. II. Abth. f. Syst. 1888, p. 714). In that paper both specimens were referred by me to the typical *P. canaliculatus* Oliv., erroneously because in both females the lateral margins of the telson bear three movable spinules.

The type specimen from Sydney about which the reader shall find some remarks at p. 110, is identical with *P. canaliculatus* var. *australiensis* Sp. Bate of the Report on the Challenger Macrura, and the name *plebejus* has therefore the priority. The other specimen from Japan, however, proved to belong to *P. latisulcatus* Kish.; it is 135 mm. long, almost adult, for this species attains the length of 15 cm. It perfectly agrees with KISHINOUYE's description, the rostrum is $\frac{10}{1}$-dentate and the thelycum has the characteristic form of this species with "the anterior protuberance divided into two thin calcareous horns".

I was also enabled to examine the specimen from Djeddah, Red Sea, referred by me in 1880 (l. c.) to *P. canaliculatus* and preserved in the Leyden Museum. It is a young female, long 110 mm., that apparently also belongs to *P. latisulcatus* Kish. The rostrum is $\frac{11}{1}$-dentate and as long as the antennular peduncle. The only difference which I observe between this female and the somewhat larger female from Japan is presented by the two horns in which the anterior protuberance of the thelycum terminates. In the Djeddah specimen these horns are comparatively longer, more slender, tapering, pointed, distinctly curved forward towards the sternum and nearly parallel. In the japanese specimen, however, the two horns are shorter, of a less slender form, less pointed, not parallel, but slightly divergent and not curved forward. As no other differences apparently exist, the different form of these horns may be due to the younger age of this specimen.

The species described by DE HAAN (Fauna Jap. Crustacea, p. 190) in my opinion belongs to *P. latisulcatus*, because the thelycum is described as being "ante medium fissum". His description, however, is inaccurate: in the beginning he says that the third legs are unarmed, but afterwards that they are unispinose. DE HAAN's species was referred by Dr. NOBILI, however, to *P. japonicus* Sp. Bate (in: Annal. Scienc. Nat. 9e Sér. T. IV, 1906, p. 10).

The specimens collected by the "Siboga" are all of a smaller size than the adult female from Japan, but, no doubt, all belong to this species.

The largest of the 9 specimens from Kawa-bay, a male, is 115 mm. long. The rostrum, as long as the antennular peduncle, is $\frac{11}{1}$-dentate, five teeth are on the carapace, the 1st is twice as far distant from the 2nd as the 2nd from the 3rd. The groove of the post-rostral carina is much narrower in the middle than the lateral furrows, but, slightly widening backwards, it appears at the posterior end almost equally broad. The spinules on the lateral margins of the telson, three on each, are a little larger than in *P. japonicus* Sp. Bate. The rostrum of three other males shows the same rostral formula, but that of the fourth is $\frac{12}{1}$-dentate. The rostrum of one female is broken, in the three others the rostral formulae are $\frac{11}{1}$, $\frac{12}{1}$ and $\frac{13}{1}$, the last formula being that of a female long 80 mm. In this specimen four teeth are on the carapace, the 1st is

not yet twice as far distant from the 2nd as the 2nd from the 3rd. In this species the fingers of the chelate legs are a trifle shorter than in *P. japonicus*.

The rostrum of the female from Stat. 213, that is 78 mm. long, reaches to the end of the penultimate joint of the antennular peduncle and is $\frac{11}{1}$-dentate; the 5th tooth is placed above the orbital margin, the 1st is twice as far distant from the 2nd as the 2nd from the 3rd. The female from Stat. 234 has nearly the same size, the tip of the rostrum is broken off.

The female from Tiur-island measures 67 mm., at this age the two lobes of the thelycum are not yet in contact, but separated by a narrow fissure from one another.

Remarks. The type of *P. plebejus* Hess from Sydney is a well-preserved female, nearly 15 cm. long. *P. canaliculatus* var. *australiensis* Sp. Bate, the type specimen of which I have observed during my visit to the British Museum in the summer of 1908, is identical with this species. Like *P. japonicus*, also *P. plebejus* Hess ought to be considered as a proper species, not as a variety of *P. canaliculatus*. The rostrum, $\frac{10}{1}$-dentate, reaches almost to the end of the 3rd antennular article. The tooth on the lower margin is situated just below the foremost tooth of the upper. The groove of the rostral carina and the two lateral grooves resemble those of *P. latisulcatus*, but one observes, at either side of the rostrum, about midway between the lateral rostral carinae and the tips of the teeth, another carina that commences near the base of the first rostral tooth and that, gradually narrowing, is continued to the foremost tooth, where it passes into the upper margin of the rostrum. This second carina is wanting in *P. latisulcatus*.

In *P. canaliculatus*, *P. japonicus*, *P. latisulcatus* and in *P. plebejus* there is a small post-ocular spine, continued as a ridge that runs parallel with the rostral crest; posteriorly, as Dr. Alcock describes for *P. japonicus* (l. c. 1906, p. 15), this ridge is, in all these species, recurved on itself to form a narrow loop. It is also observed in *P. caramote* of the Mediterranean, but in *P. brasiliensis* Latr. such a loop does not exist. In the type of *P. plebejus*, however, there are two loops, instead of one, between the posterior part of the post-ocular ridge and the rostral crest; of the two loops that are separated from one another, from the rostral crest and from the post-ocular ridge, by deep, though narrow, sulci, the inner is a little shorter than the outer. As regards the other grooves and crests on the carapace *P. plebejus* accords with *P. latisulcatus*. In *P. plebejus* the carpal joints of the thoracic legs show a somewhat stouter shape than in *P. latisulcatus*, but the difference is slight and only recognizable by accurately comparing the two species.

The thelycum, finally, has a somewhat different form from that of *P. latisulcatus*. The two lateral plates or lobes come in contact with each other at the median line, as in *P. latisulcatus*, the distal third or fourth part excepted, but their form is semi-elliptical, and their lateral margins, that are slightly curved, run nearly parallel, whereas in *P. latisulcatus* they distinctly diverge backward. The lobes show about the form figured by Bate (Challenger Macrura, Pl. XXXII, Fig. 3″), except that in this figure the lobes are not in contact. In *P. latisulcatus* the two lobes are therefore broader at their base than in the middle, whereas in the australian species they are a little broader in the middle than posteriorly. The median protuberance differs likewise. Both in *P. latisulcatus* and in *P. plebejus* it consists of a posterior

part, bounded at either side by a small ridge and an anterior that terminates anteriorly in two horns. In the female of *P. latisulcatus* this posterior part is shorter than the anterior, the two horns are comparatively large and separated by a broad interspace. In *P. plebejus*, however, the posterior part is larger than the anterior, that is deeply excavate on its outer side, and the two horns are very small and almost contiguous. This protuberance has been quite wrongly figured by SPENCE BATE: as a plate not in contact with the lobes. The sternal somites between the three pairs of chelate legs are longitudinally carinate in both species.

Probably the petasma of the male of *P. plebejus*, which is still unknown, will also show some differences.

Concerning the type specimen of *P. canaliculatus* var. *australiensis* Sp. Bate Dr. CALMAN of the British Museum kindly wrote me the following: "The specimen is about 106 mm. long (not 100 mm. as given by SPENCE BATE). The accessory carinae are present, just as you describe them in *P. plebejus*, but the groove which defines each on the inner side from the rostral teeth becomes indistinct in front of the fourth tooth, so that, on the rostrum itself, the accessory ridges are only a little better defined than the slight ridges occupying the same position in *P. canaliculatus*. Posteriorly, however, the accessory ridges are quite distinct and end just behind the first tooth.

The double loop of the post-ocular ridge is well-marked in SPENCE BATE's type, exactly as in your figure. The rostral formula is $\frac{10}{1}$, with four teeth on the carapace, and the lower tooth between the two foremost upper teeth".

General distribution: Tokyo Bay and Kagoshima, Japan (KISHINOUYE); Penang (LANCHESTER); Batjan (DE MAN); Red Sea (DE MAN).

Subfamily SICYONINAE Ortmann.

Sicyonia H. M.-Edw.

The genus *Sicyonia* H. M.-Edw. is represented at present by about 20 species, most of which are found in the Indopacific. *Sic. carinata* Olivi, with which *Sic. sculpta* H. M.-Edw. is identical, inhabits the Mediterranean and the Adriatic Seas, but has also been observed off the Cape Verde Islands by the "Challenger" and it has been recorded from Goree Island, Senegambia; a variety *americana* de Man, described in: The Transactions of the Linnean Society of London, 1907, occurs on the east coast of South America off Bahia. It is noteworthy that this species has been recorded in 1905 by Dr. PEARSON from Trincomalee, under the name of *Sic. sculpta* and in 1910 by Dr. BORRADAILE, according to the papers quoted by him, from Haddumati Atoll, Maldive Islands, under the name of *Sic. carinata* (Olivier). Four other species occur also in the Atlantic. *Sic. Edwardsi* Miers, with which *Sic. carinata* of H. MILNE-EDWARDS and of the Challenger Report is identical, inhabits the West Indies, while it ranges northward to Charlotte Harbour and Sarasota Bay, Florida, and southward to Bahia and Rio de Janeiro. *Sic. brevirostris* Stimps. is found on the coasts of Cuba and Florida and extends its range northward to Cape Hatteras. *Sic. dorsalis* Kingsley occurs in the West Indies and on the coast

of Florida. The fourth, *Sic. laevigata* Stimps., occurs also in the sea of the Antilles and on the coasts of Florida, and it ranges northward to Charleston, S. C.

Three species are known from the tropical and subtropical seas on the west coast of America. *Sic. penicillata* Lock. occurs in the Gulf of California and on the coast of Lower California, while the two others, *affinis* Fax. and *picta* Fax., are found on the west coast of Central America: *Sic. Edwardsi* Miers from the Antilles is represented on the west coast by the former, while *Sic. picta* is the representative both of the atlantic *Sic. dorsalis* Kingsley and the indopacific *Sic. laevis* Sp. Bate.

A dozen of species of *Sicyonia* are found in the Indopacific, including the 4 new species discovered by the "Siboga". *Sic. lancifer* (Oliv.) is distributed from Japan (Sagami Bay, Kagoshima) and the Arafura Sea, south of Papua, to Penang, the Gulf of Manaar, the Maldives and to the Red Sea; it is one of the nine species that were captured by the "Siboga", a specimen having been taken in the Bay of Pidjot, Lombok. *Sic. cristata* de Haan occurs on the coast of Japan and is recorded by PEARSON from Ceylon, but this species is perhaps identical with *Sic. lancifer*. *Sic. trispinosa*, a new species, that bears a close resemblance to the mediterranean *Sic. carinata* Olivi, but that has a much smaller size, was discovered at the Paternoster-islands and in Molo-strait. *Sic. ocellata* Stimps. ranges from Thursday Island to Hongkong, Singapore and Ceylon. *Sic. bispinosa* de Haan, hitherto only known from Japan, was captured off North Ubian in the Sulu Sea. *Sic. laevis* Sp. Bate was taken by the "Challenger" North of New Guinea, by the "Siboga" between the islands of Ceram and Buru and is recorded by Miss RATHBUN from the Hawaiian Islands. *Sic. parvula* de Haan, hitherto only known from Japan, was captured near Salawatti and off the Jedan Islands by the Aru Islands. The new *Sic. rectirostris* was taken in Sanana-bay, east coast of Sula Besi and *Sic. fallax*, which is also new to science, was discovered near the Sulu-islands; the latter is closely related to *Sic. longicauda* Rathb., which is only known from the Hawaiian Islands. *Sic. furcata* Miers occurs at the Sulu-islands. The new *Sic. benthophila*, finally, was taken off the Kei-islands. Two unnamed species have been described by W. A. HASWELL from specimens occurring on the east coast of Australia; one of them, from Port Jackson, is probably identical with *Sic. ocellata* Stimps.

When *Sic. furcata* is included, all the indopacific species of *Sicyonia* prove to occur in the East Indian Archipelago, except only *Sic. longicauda* Rathb. and *Sic. cristata* de Haan.

It is quite remarkable that all the species captured by the "Siboga" are represented in the collection only by one or two specimens, excepting *Sic. parvula*, of which nine specimens were taken.

Most species of this genus seem to occur in rather shallow water. *Sic. carinata* Olivi e. g. was taken in Goree Bay between 9 and 15 fathoms, the variety *americana* at a depth of 2,5 fathoms; *Sic. Edwardsi* and *Sic. brevirostris* are not found deeper than 27 resp. 35 fathoms, *Sic. laevigata*, *trispinosa*, *lancifer*, *ocellata*, *penicillata* and *rectirostris* are also only known from shallow water and of *Sic. bispinosa* a specimen was captured by the "Siboga" at the surface. *Sic. laevis* was taken by the "Challenger" at 150 fathoms, but by the "Siboga" in water of 36 meter.

Other species, however, are found in considerably deeper water. The new *Sic. fallax*

and *Sic. benthophila* were captured at depths respectively of 275 and 304 meter, *Sic. dorsalis* was taken off Habana in water of 230 fathoms and, according to Miss RATHBUN, *Sic. longicauda* occurs, off the Hawaiian Islands, between 295 and 351 fathoms, but also between 53 and 324 fathoms.

† 50. *Sicyonia benthophila* de Man.

J. G. DE MAN, in: Notes from the Leyden Museum, Vol. XXIX, 1907, p. 143.

Stat. 253. December 10. 5° 48'.2 S., 132° 13' E. Near Kei-islands. 304 m. Grey clay, hard and crumbly. 1 female.

A new remarkable, deep-sea species, related to *Sic. picta* Fax. from the west coast of Central America.

The carapace, rostrum included, measures about one-third the total length and is longer in proportion to its height than in most other species: the carapace, indeed, 4,22 mm. long without the rostrum, is 2,7 mm. high in the middle, appearing therefore one and a half as long as high. Carapace everywhere, though rather not thickly, covered with very short setae, that are 0,04 mm. long. There is one small tooth in the median line of the carapace, just in the middle, though the tip reaches a little in front of it; behind this tooth the carapace is rounded; a second tooth is placed anteriorly, not far from the anterior margin of the carapace, the distance between the latter and the tip of the tooth being $^1/_9$ the length of the carapace. As in *Sic. picta*, the rostrum is short and high, reaching, just beyond the eyes, to the far end of the 1st joint of the antennular peduncle; different, however, from this species, the rostrum is quite horizontal, the straight upper margin being in a line with the upper margin of the carapace. The upper margin bears 3 teeth, all on the rostrum itself, the 1st tooth is a little farther distant from the anterior tooth on the carapace as from the 2nd rostral tooth, that is half as far distant from the 3rd as from the 1st. The lower margin, fringed with plumose setae, is slightly arcuate and, curving upward, ends in a tooth, that reaches as far forward as the 3rd tooth of the upper border; between these two teeth one observes an obtuse tubercle on the truncate distal extremity of the rostrum and this tubercle that carries a few setae is much shorter than the tooth at the end of the lower margin and than the tooth at the end of the upper; a proper, acute tip of the rostrum does not exist. The rostrum is 0,54 mm. broad in the middle, 0,56 mm. at its base and 0,3 mm. just behind the tubercle at the tip, appearing here about half as wide as at the base; the lateral carina, that extends to the base of the tooth at the end of the lower margin, is in the middle of the rostrum twice as far distant from the upper than from the lower margin.

Orbital angle subacute, the orbital portion of the anterior margin of the carapace making a right angle with the antennal portion. Antero-inferior angle of the carapace rounded. Groove defining the gastric region distinct, hepatic spine slender, of moderate size; branchiostegal groove, below the hepatic spine, well-cut, slightly ascending backward and reaching to the level of the posterior tooth in the median line of the carapace.

The abdomen that is curved downward, is, as usually, carinate, but the carinae are

flattened, there being no groove between them; the carina of the 1st tergum is produced into a small acute tooth, much smaller than in *Sic. picta*, the carinae of the 5th and of the 6th somites end in a tooth, that of the 5th being a little smaller than that of the 6th. The 6th somite, one and a half as long as the 5th, is 2,3 mm. long and 1,26 mm. broad in the middle, and is thus almost twice as long as broad. The abdominal somites are not at all sculptured, but quite smooth, except the transverse furrows on the pleura; on the pleura of the 1st somite these furrows are hardly discernible, on those of the 2nd and the 3rd one observes a shallow, anterior, transverse furrow, a posterior is hardly marked, and on the 4th and the 5th pleura a posterior furrow is present. The pleura are rounded below, their postero-inferior angle rounded or obtuse; the posterior margin of the 6th somite makes a right angle with the lower, the angle being not dentiform. The telson, 3,1 mm. long, one-third longer than the 6th somite, is elongate, the median furrow is shallow and it bears a pair of small spinules just near the tip. The telson is nearly as long, but little shorter than the lateral swimmerets.

Eyes of moderate size, shorter than the rostrum and than the 1st joint of the antennular peduncle; cornea black, distinctly facetted.

As in other species the antennular peduncle just extends beyond the antennal scales; stylocerite slender, as long as the eyes, slightly directed outward like the spine at the far end of the outer margin of the 1st article, and this spine reaches to the 2nd third part of the 2nd article; 2nd article one and a half as long as wide. Flagella of equal length, about as long as the 2nd and the 3rd joints combined; inner flagellum 8-jointed, tapering, 1st joint twice as long as the 2nd.

Antennal peduncle as long as the eyes; flagella 6,5 mm. long, a little longer than the carapace, rostrum included, composed of 32 joints, each of which bears two or three long setae near the distal extremity. Distal extremity of the scale truncate, spine at the far end of the outer margin slightly curved inward, reaching beyond the scale.

Thoracic legs slender. First pair bispinose, carpus (1 mm.) little longer than the merus (0,85 mm.) and than the chela (0,9 mm.), fingers almost one and a half as long as the palm; carpus slender, 6-times as long as thick at the distal extremity. Legs of the 2nd pair reaching to the tip of the scales; carpus (1,8 mm.) slender, 15-times as long as thick in the middle, longer than the merus (1,3 mm.) and than the chela (1,06 mm.); fingers one-fifth longer than the palm. The merus, the carpus, the propodus and the dactylus of the 4th pair are respectively 1 mm., 1,3 mm., 0,78 mm. and 0,56 mm. long, those of the 5th measure 1,56 mm., 1,8 mm., 0,9 mm. and 0,6 mm.: the carpus of the 4th pair, which is 10-times as long as thick in the middle, appears as long as the two following joints taken together. The carpus, finally, of the 5th pair, which is 15-times as long as thick in the middle, is twice as long as the propodus.

The sternum carries one acute tooth just behind the coxae of the 1st pair, and two teeth immediately behind those of the 2nd pair; the large, cordiform plate of the thelycum is 1,04 mm. long and 0,6 mm. broad posteriorly, being more than one and a half as long as broad.

Length 17,7 mm., length of the carapace, rostrum included, 5,6 mm., without it 4,22 mm.

†51. *Sicyonia fallax* de Man.

J. G. DE MAN, in: Notes from the Leyden Museum, Vol. XXIX, 1907, p. 141.

Stat. 105. July 4. 6°8′ N., 121°19′ E. Sulu Sea. 275 m. Coralbottom. 1 female.

It is with some doubt that this specimen is described as a new species, because it is apparently closely related to *Sic. longicauda* Rathb. from the Hawaiian Islands (vide: U. S. Fish. Commission Bull. for 1903, Part III, Wash. 1906, p. 908, Pl. XX, Fig. 6).

This specimen is 45 mm. long, the carapace, without the rostrum, measures 9,3 mm., the rostrum alone 4,2 mm., the abdomen 31,5 mm.

The body is covered with a close and short tomentum, that, however, is rubbed off from the greatest part of the abdomen; a few longish, fine setae are implanted on the carapace near the rostral crest and near the dorsal crest of the abdomen, a few also on the sides of the carapace and on the abdominal pleura. The rostrum is shorter and less slender than in *Sic. longicauda* and reaches, beyond the eyes, barely to the far end of the 1st joint of the antennular peduncle; it appears still more strongly ascending and broader at its base than in that species. Upper margin with 4 teeth, the 1st or posterior just behind the frontal margin of the carapace, its tip a little farther distant from that of the 2nd as the latter from the tip of the 3rd; the 3rd tooth is a little farther distant from the 4th as from the 2nd and the 4th is about one and a half as far from the 3rd as from the tip that is acute. A small tooth exists, just below the tip, at the far end of the slightly convex, lower margin, so that the tip appears tridentate; lower margin fringed with long hairs. Ridge on the lateral side of the rostrum situated close to the lower margin. Of the two teeth on the dorsal crest of the carapace the posterior is larger than the anterior and more prominent than in *Sic. longicauda*; the dorsal crest extends almost to the posterior margin, ending at a distance of 0,4 mm. from it.

Outer angle of the orbits obtuse, antero-inferior angle of the carapace rectangular, obtuse; hepatic spine long and slender.

The abdomen much resembles that of *Sic. longicauda*, but the 6th somite is hardly one and a half as long as the 5th, the 6th somite being 5,5 mm. long, the 5th 4 mm.; the 6th somite, 3,4 mm. broad, appears somewhat more than one and a half as long as broad. The abdominal somites are nearly smooth; one observes a faint transverse furrow on the pleura, that are incompletely separated from the terga by a ridge, but this ridge is almost indistinct on the 3rd and 4th somites. The telson is 7 mm. long, clearly longer than the 6th somite; it is deeply furrowed and carries a pair of small spinules just near the acute tip. The outer uropod is just as long as the telson, the inner a trifle longer.

The eyes are of moderate size and just reach beyond the middle of 1st antennular article, cornea grayish, near its posterior margin more blackish. Outer margin of 1st antennular article with two slender spines; 2nd article little shorter than the 1st, 3rd much smaller and narrower, measuring one-fourth the 2nd; lower (inner) flagellum as long as the 2nd article, upper flagellum thicker, nearly just as long.

Basal joint of outer antennae with a strong spine at the outer angle, peduncle reaching

not yet to the middle of the scale, the lamina of which is truncate distally and surpassed by the distal spine; flagellum hairy. External maxillipeds reaching to the tip of the antennal scales.

The legs of the 1st pair that support a strong spine at the base and another at the ischium, reach to the end of the antennal peduncle; carpus a little longer than the merus and than the chela, fingers one and a half as long as the palm. The legs of the 2nd pair reach almost to the tip of the scales, carpus one-third longer than the chela, fingers one and a half as long as the palm. The legs of the 3rd pair reach almost with their whole chela beyond the antennal scales, carpus one and a half as long as the chela, fingers one-fourth longer than the palm. The much shorter legs of the 4th pair do not yet reach to the middle of the antennal peduncle, whereas those of the 5th extend with their dactyli beyond the tip.

The thelycum consists 1° of two divergent, flattened plates, that are as long as broad and that unite posteriorly, whereas they are rounded anteriorly, and 2° of a large, flattened, triangular, acuminate plate that reaches to the coxae of the 2nd legs, while posteriorly it overhangs the two rounded lobes. There is a small tooth on each of the sternal ridges of the five anterior abdominal somites.

Remarks. *Sicyonia longicauda* Rathb. seems to differ by a more slender, more pointed and longer rostrum, by the smaller, less prominent teeth of the dorsal crest, by the 6th abdominal somite being nearly twice as long as the 5th (though in the figure it appears hardly so long) and perhaps still by other differences.

†52. *Sicyonia rectirostris* de Man.

J. G. de Man, in: Notes from the Leyden Museum, Vol. XXIX, 1907, p. 141.

Stat. 193. September 13/14. Sanana-bay, East coast of Sula Besi. 22 m. Mud. 1 female.

This specimen is 21 mm. long, length of the carapace 7,1 mm., rostrum included, and 5,25 mm. without it. The rostrum is horizontal, measures about one-third the rest of the tomentose carapace and reaches hardly beyond the 1st joint of the antennular peduncle, extending just beyond the eyes. Being 0,6 mm. broad at its base and 0,275 mm. at the level of the 4th rostral tooth, the rostrum appears, in a lateral view, to narrow considerably and to be hardly half as broad distally as at the base. The upper margin is armed with 5 rather low teeth and there is one tooth at the far end of the straight, lower margin. The 1st tooth stands above the anterior border of the carapace, the tip just reaches beyond it; the distances between the following teeth gradually, though slightly, decrease and the distance between the 4th and the 5th tooth, that is somewhat curved downward, is only one-third the distance between the 3rd and the 4th. Unfortunately the tip of the rostrum and the tooth at the end of the lower margin that runs quite horizontally, are broken off, but the tip is no doubt strongly curved downward as in *Sic. bispinosa* and other species, projecting less forward than the 5th tooth of the upper margin. The lateral carina reaches almost to the tip and runs close to the lower margin, its distance from the latter being hardly one-third the distance between the carina and the upper margin of the 3rd rostral tooth.

There are two teeth on the dorsal carina of the carapace, that are also rather low,

though a little larger than the rostral teeth; the tip of the anterior tooth is 1,5 mm. distant from the anterior border of the carapace, a little more than one-fourth its length and also 1,5 mm. from the tip of the posterior tooth, which is situated a short way behind the middle of the carapace. The anterior tooth is just as far distant from the 1st rostral tooth as the latter from the 4th and a line uniting the tips of all the teeth curves slightly downward. Short spiniform setae are implanted close to the upper margin of the two teeth that stand on the carapace and two or three very long setae of the usual form near their tips.

Orbital angle obtuse. Hepatic spine small, situated at the level of the upper margin of the basal joint of the outer antennae. Branchiostegal groove, beneath the hepatic spine, horizontal, rather deep, not yet reaching to the level of the tip of the cardiac tooth. The abdomen resembles that of *Sic. parvula*; it is solely the carina of the 1st tergum that is produced into a sharp tooth and the anterior portion of the pleura of the 1st somite is flattened, without any trace of a groove. The longitudinal ridges on the posterior part of the terga are little prominent. There is a small tooth at the posterior angle of the 4th pleura, but a spine at those of the 5th and the 6th.

Eyes large, flattened above, a little shorter than the rostrum. As regards the two pairs of antennae and the other thoracic appendages, this species resembles *Sic. parvula*.

† 53. *Sicyonia parvula* de Haan.

Sicyonia parvula de Haan, Fauna Japon. Crust. 1849, p. 195, Tab. XLV, Fig. 6.

Stat. 164. August 20. 1° 42′.5 S., 130° 47′.5 E. Between Misool and New Guinea. 32 m. Sand, small stones and shells. 8 specimens, males and females, all young.
Stat. 273. December 23/26. Anchorage off Pulu Jedan, East coast of Aru-islands. (Pearl-banks). 13 m. Sand and shells. 1 young specimen.

Though de Haan's description is very brief, there can be little doubt that these specimens indeed belong to this species, for they are perfectly well in accordance with the quoted figure. Unfortunately the specimens are all young, the largest individuals measuring 17 mm.; the carapace, rostrum included, is here 6,25 mm. long, but *Sic. parvula* attains a length of 30 mm. The rostrum that almost reaches to the end of the 2nd antennular article, is characteristic, as it is in most species of this genus, and rightly defined by the words "rostro sensim angustiore". Whereas the rostrum of *Sic. laevis* appears more than twice as broad at its base than at the tip, that of the present species very little narrows distally: in two specimens from Stat. 164 it is almost one-third broader at the base than at the level of the penultimate tooth of the upper margin, but in the other individuals the difference is still much smaller, and the rostrum appears then barely broader at the base than near the tip; so e. g. in a female long 17 mm. the rostrum is 0,48 mm. broad at the base and 0,44 mm. at the level of the penultimate tooth of the upper margin. In all the specimens the upper margin of the rostrum bears 5 teeth, the 1st of which is placed on the carapace, and 1 tooth just below the spiniform tip, that is curved downward; in a male from Stat. 164 the 1st tooth is more than one and a half as far distant from the 2nd as the 2nd from the 3rd and the distances between

the following teeth become still smaller; the slightly curved, anterior or 5th tooth reaches as far forward as the pointed tip of the rostrum, that just projects beyond the tooth at the end of the lower margin.

There are two teeth on the dorsal carina of the carapace and these teeth are also low; the tip of the posterior tooth is placed at the posterior third of the carapace, the tip of the anterior or gastric tooth just in front of the middle and as far distant from the tip of the posterior tooth as from that of the 1st rostral tooth; the 1st tooth of the rostrum is one and a half times as far distant from the gastric tooth as from the 2nd rostral tooth. In the middle of the rostrum the lateral carina is situated somewhat more than twice as far from the tips of the teeth as from the lower margin; the lateral surface of the rostrum carries, on its distal half, between the lower margin and the lateral crest two or three larger and several smaller, spiniform setae.

Orbital angle obtuse, hepatic spine small. The branchiostegal groove is distinct as a transverse furrow beneath the hepatic spine, running from this spine to the level of the middle of the anterior or gastric tooth of the carapace. An arcuate furrow or depression extends towards the posterior extremity of the gastric tooth, defining the gastric region.

The carina of the 1st abdominal tergum is produced into a small tooth, but that of the 2nd is obtuse at its anterior extremity. The longitudinal ridges on the posterior part of the three first abdominal terga are conspicuous, but on the three posterior they are indistinct. The pleura of the 1st somite bear no transverse groove on their anterior portion; those of the 5th and of the 6th are armed with an acute tooth at their postero-inferior angle.

Eyes shorter than the rostrum. The antennular peduncle reaches just beyond the truncate tip of the antennal scales; stylocerite slender, hardly reaching beyond the eye-peduncles. The acute tooth at the far end of the outer margin of 1st article reaches almost to the middle of the 2nd article. Flagella twice as long as the 3rd article and as long as the 2nd.

External maxillipeds reaching as far as the antennal scales.

The legs of the 1st pair are bispinose, fingers a little longer than the palm; the fingers of the 2nd pair are as long as the palm and those of the 3rd are a little shorter than it. The chelae of the 3rd legs are little more than half as long as the slender carpus, which is 16-times as long as thick. The legs of the 5th pair reach almost to the end of the antennal peduncle; their carpus is just as long as the two last joints combined and their dactylus measures three-fifths the propodus.

As regards the young specimen from Stat. 273, I will only remark that the rostrum is just as broad at the level of the penultimate tooth of the upper margin as at the base.

General distribution: Japan (DE HAAN).

† 54. *Sicyonia laevis* Sp. Bate.

Sicyonia laevis C. Spence Bate, Report Challenger Macrura, 1888, p. 298, Pl. XLIII, Fig. 5.

Stat. 184. September 11/12. Anchorage off Kampong Kelang, South coast of Manipa-island. 36 m. Coral, sand. 1 young female.

It is with some doubt that this specimen is referred to *Sic. laevis*, but the differences between it and BATE's description are probably due to the difference of age.

This female is 17,5 mm. long, the carapace, rostrum included, 7 mm. long, without it 5 mm. The carapace appears a little higher, at the level of the cardiac dorsal tooth, in proportion to its length than in the figure of the Challenger Report: at the level of the orbital margin the carapace is 5,3 mm. long, whereas it is 4,2 mm. high at the level of the posterior dorsal tooth, in the figure, however, of the adult specimen in the Challenger Report the proportion is as 3 : 2. The rostrum that reaches to the middle of the 2nd joint of the antennular peduncle, is slightly ascending and, as in the type, it narrows considerably from its base to the tip: at the base, indeed, the rostrum is 0,85 mm. broad, at the tip 0,34 mm., the teeth included, so that the rostrum appears to be more than twice as broad at the base than at the tip. The upper margin carries 4 teeth, the 1th of which stands on the carapace, immediately behind the anterior margin, just above which occurs the tip of the tooth; the distances between these teeth that are rather low, slightly decrease forward, so that the distance between the 1st and the 2nd is one-third longer than that between the 2nd and the 3rd and the foremost tooth is placed a little nearer to the 3rd as the 3rd to the 2nd. Whereas the upper margin of the first three teeth is straight, that of the 4th is distinctly curved downward; below the 4th tooth is lying the tip of the rostrum, the extremity of which unfortunately is broken off and just below the tip is situated the acute tooth of the lower margin; one observes between this tooth and the tip of the rostrum a rounded prominence that bears a tuft of setae. The lateral crest of the rostrum runs twice as far distant from the upper than from the lower margin.

The two dorsal teeth of the carapace are larger than those of the rostrum itself, but also rather low; the tip of the cardiac tooth is situated just behind, the tip of the gastric tooth just before the middle of the carapace.

The orbital angle is obtuse, whereas it is described by SPENCE BATE as produced to a point.

The tooth on the 1st abdominal tergum is not yet so long as in BATE's specimen, that was 30 mm. long, and the carina of the 2nd does not end in a tooth at all. The abdomen seems to agree for the rest with the quoted figure in the Challenger Report; the pleura of the 4th somite carry a small tooth at their postero-inferior angle and another of the same size just above it, these teeth are not spiniform, but the pleura of the 5th and of the 6th somite end in a spiniform tooth at their posterior angle.

Eye-peduncles decidedly shorter than the rostrum and even shorter than the 1st joint of the antennular peduncle; the outer margin of this joint ends in a strong tooth that reaches to the middle of the 2nd joint and immediately behind this tooth there is a much smaller one. The antennular peduncle reaches as far as the lamina of the antennal scales; this lamina is truncate distally, the distal margin making a right angle with the inner border; the outer margin of the scale is slightly concave and the terminal spine is slightly curved inward and projects beyond the lamina.

The abdominal sterna carry each a strong acute tooth in the middle.

General distribution: North of New Guinea (SPENCE BATE); Hawaiian Islands (M. RATHBUN).

† 55. *Sicyonia bispinosa* de Haan.

Sicyonia bispinosa de Haan, Fauna Japonica. Crustacea, 1849, p. 195, Tab. XLV, Fig. 9.

Stat. 99. June 28/29/30. 6°7'.5 N., 120°26' E. Anchorage off North-Ubian, Sulu Archipelago. 1 young male, taken at the surface.

The identification of this specimen, that is very young, with *Sic. bispinosa* is probably also correct; it agrees fairly well with the description, but, as regards the figure, I wish to remark that the rostrum appears in this specimen a little less broad in proportion to its length. It is only 13,5 mm. long, whereas *Sic. bispinosa* attains a length nearly 3-times as large. The rostrum that reaches to the far end of the 2nd article of the antennular peduncle, and that is rather strongly ascending, is 2,2 mm. long, measuring two-fifths the rest of the carapace and it is 6-times as long as wide. It appears to be 0,36 mm. broad as well at the base as at the level of the 3rd tooth, this tooth included, and both margins are therefore parallel. The upper margin bears 5 rather small teeth that are all placed on the rostrum itself; the 1st tooth stands at the first fourth of the upper margin, the 2nd is just as far distant from the 1st as from the 3rd, the 4th is half as far distant from the 3rd as are the preceding teeth from one another and it is situated close to the 5th near the pointed tip of the rostrum; the 4th and the 5th are curved downward and this is still more the case with the pointed extremity of the rostrum, which extremity is strongly curved, the tip being almost at a right angle with the rostrum, so that the 5th tooth even projects beyond it. The tooth at the end of the lower margin reaches not so far forward as the 4th tooth of the upper. The toothing of the rostrum which is tridentate at the tip, therefore fully agrees with DE HAAN's description and figure. The lateral crest that disappears just beyond the 2nd tooth, runs as far distant from the upper as from the lower margin. Close to the straight lower margin three or four spiniform setae are implanted, at either side, between the 2nd and the 3rd tooth.

There are two teeth on the dorsal carina of the carapace, that are much larger than the rostral teeth; the tip of the anterior tooth is situated at one-fourth the length of the carapace from its anterior margin and more than one and a half times as far distant from the tip of the 1st rostral tooth as the latter from the tip of the 2nd tooth, and little farther distant from the tip of the 1st rostral tooth as from that of the posterior tooth of the carapace. The tip of the posterior tooth is situated just behind the middle of the carapace.

Orbital angle subacute; hepatic spine of moderate size, its tip twice as far distant from the orbital angle as the spine itself is long.

The abdomen resembles that of *Sic. parvula* de Haan.

The eye-peduncles hardly reach to the middle of the rostrum. As in *Sic. parvula*, the antennular peduncle reaches with one-half of its terminal joint beyond the truncate tip of the lamina of the antennal scales, but the peduncle has a more slender form: so e. g. the 2nd joint appears in *Sic. parvula* one and a half times, but in *Sic. bispinosa* twice as long as wide, when viewed at from above. The spine at the far end of the outer margin of the 1st article is also more slender and the distance between its tip and that of the stylocerite is just as long as the 2nd article.

The thoracic legs of which those of the 1st pair are also bispinose, resemble the legs of *Sic. parvula*.

General distribution: Japan.

† 56. *Sicyonia ocellata* Stimps.

Sicyonia ocellata W. Stimpson, in: Proc. Acad. Nat. Scienc. Philadelphia, 1860, p. 43.
Sicyonia ocellata E. J. Miers, in: Report Voy. H. M. S. "Alert", 1884, p. 295.
Sicyonia ocellata G. Nobili, in: Boll. Mus. Zool. Torino, XVIII, N° 455, 1903, p. 6.

Stat. 37. March 30/31. Sailus ketjil, Paternoster-islands. 27 m. and less. Coral and coralsand. 1 young female.
Stat. 301. January 30—February 1. 10° 38′ S., 123° 25′.2 E. Pepela-bay, east coast of Rotti-island. 18—45 m. Mud, coral and Lithothamnion. 1 young female.

The female from Stat. 301 is 19,5 mm. long, whereas, according to Dr. Nobili, the female attains a length of 40 mm.; the other specimen is still of smaller size. In neither of the two the eye-shaped, black spot on the carapace nor the white spots on the sides of the abdomen are visible. In the larger specimen the carapace and the rostrum carry 6 teeth, 3 on the carapace and 3 on the rostrum; the foremost tooth is a little larger than the acute tip of the rostrum, above which it is situated, so that the rostrum appears bidentate at the tip, not tridentate, because there is no small tooth on the lower margin. The other specimen shows the same toothing, but the rostral crest is less strongly arcuate and the foremost tooth of the rostrum has the same size as the tip.

In the 1st and 2nd pair of legs the fingers are distinctly longer than the palm, but the fingers of the 3rd pair are a little shorter than it.

The thelycum and the spiniform plate show a different form from that of *Sic. lancifer* (vide: Report Challenger Macrura, 1888, Pl. 43, Fig. 4″), a species with which it is compared by Nobili, probably due to the young age of these specimens.

General distribution: Hongkong (Stimpson, Miers); China Sea, lat. 24° N. (Stimpson); Ceylon (Miers); Singapore (Nobili); Thursday Island (Miers).

† 57. *Sicyonia trispinosa* de Man.

J. G. de Man, in: Notes from the Leyden Museum, Vol. XXIX, 1907, p. 142.

Stat. 37. March 30/31. Sailus ketjil, Paternoster-islands. 27 m. and less. Coral and coralsand. 1 male.
Stat. 51. April 19. Madura-bay and other localities in the southern part of Molo-strait. From 54—90 m. Fine grey sand; coarse sand with shells and stones. 1 female.

Unfortunately the female from Stat. 51 is much injured, the carapace being broken behind the rostrum; therefore the male is described, which is probably adult, as the petasma is fully developed.

The male from Stat. 37 is 21,75 mm. long, the carapace, rostrum included, 7 mm., without it 4,75 mm.

Sic. trispinosa bears the closest resemblance to *Sic. carinata* Olivi = *sculpta* H. M.-Edw.,

three adult females of which species from the Gulf of Naples are lying before me: it differs at first sight by its much smaller size, for the mediterranean species attains a length of 60 mm. Carapace and rostrum closely resemble those of *Sic. carinata* Olivi. Exactly as in this species the dorsal carina of the carapace is armed with three teeth; these teeth, that are rather low, are equidistant, the distance between the tip of the 1st tooth and the posterior margin is not yet one-third the length of the carapace, the tip of the 2nd is situated just in front of the middle and the distance between the tip of the 3rd tooth and the anterior margin of the carapace is one-sixth its length, measured near the dorsal line. The rostrum, slightly ascending, just as much as that of *Sic. carinata* Olivi, reaches also to the far end of the 2nd antennular article and shows exactly the same form; the width of the lateral surface, immediately behind the tooth at the end of the lower margin, is little more than half the width at the base of the rostrum. The upper margin bears in the male 4, in the female 5 teeth; the 1st of these teeth that are equidistant, is placed above the anterior margin of the carapace, though the tip projects far beyond it, and nearly as far distant from the tip of the 3rd tooth on the carapace as the latter from the 2nd; the 1st rostral tooth is one and a half times as far distant from the 3rd tooth on the carapace as from the 2nd rostral tooth. Unfortunately the extremity of the rostrum and the tips of the 2nd—4th rostral teeth and of the tooth at the end of the lower margin are, in the male, broken off, in the female they are complete and here the tip of the rostrum and the 5th tooth of the upper margin are reaching equally far. There is, in the male, a tuft of setae between the tip of the rostrum and the tooth at the far end of the lower margin. The lateral carina that reaches almost to the extremity of the rostrum, appears in the middle, i. e. at the base of the 3rd rostral tooth, just one and a half as far distant from the upper margin of this tooth as from the lower margin of the rostrum. One or two long setae are implanted on the side of the teeth that stand on the dorsal line of the carapace.

Orbital angle more obtuse than in *Sic. carinata* Olivi. Hepatic spine small, situated in a line with the upper margin of the basal joint of the outer antennae. The arcuate groove that defines the gastric region, is quite distinct, the branchiostegal groove, beneath the hepatic spine, well-cut, reaching to the middle of the carapace. The abdomen also resembles that of the mediterranean species. There is a tooth on the 1st tergum, but the carinae of the 2nd do not end in a tooth. Whereas the pleura of the 1st somite bear only one furrow in *Sic. parvula* de Haan, in *Sic. bispinosa* de Haan and in the new *Sic. rectirostris*, those of *Sic. trispinosa* are furnished, as in *Sic. carinata* Olivi, with two transverse furrows. The pleura of the 5th and of the 6th somite end at their postero-inferior angle in a spiniform tooth. Telson with a pair of small spines near the tip, little shorter than the uropods.

Eyes large, reaching not yet to the end of 1st antennular article. Antennular peduncle as in *Sic. carinata* Olivi, but the two spines on the outer margin of 1st article are more slender and the posterior spine is farther distant from the outer margin than in the mediterranean species; 2nd article one and a half as long as wide and nearly twice as long as the 3rd article. Legs of 1st pair bispinose, fingers longer than the palm, both in this pair and in the 2nd; the 3rd and the 5th legs are missing. Petasma symmetrical. The lateral margins slightly diverge from the base to just beyond the middle, terminating here in an obtuse tooth;

the anterior margin that is notched in the middle, is armed at either angle with a sharp spine which is directed straight forward and the lateral margins carry anteriorly a lateral process, terminating in two teeth, the anterior of which is pointed and curved backward, whereas the posterior is also acute, but directed obliquely forward.

58. *Sicyonia lancifer* (Oliv.).

Palaemon lancifer A. G. Olivier, Encyclop. Méthod. 1811, T. VI, p. 664, Pl. 317, Fig. 2.
Sicyonia lancifer H. Milne-Edwards, Hist. Nat. Crust. II, 1837, p. 410.
Sicyonia lancifer C. Spence Bate, Report Challenger Macrura, 1888, p. 297, Pl. 43, Fig. 4.
Sicyonia lancifer A. E. Ortmann, in: Zoolog. Jahrb. V, 1890, Abth. f. Syst. p. 453.
Sicyonia lancifer W. F. Lanchester, in: Proc. Zool. Soc. London, 1901, p. 573.
Sicyonia lancifer J. Pearson, in: Ceylon Pearl Oyster Fish. Report, 1905, p. 74.

Stat. 33. March 24/26. Bay of Pidjot, Lombok. 22 m. and less. Mud, coral and coralsand.
1 young male.

This specimen is nearly 35 or 36 mm. long, the carapace, rostrum included, is 12 mm. long and, without it, 8 mm.; it is apparently not yet adult, because the two branches of the petasma are not yet united. It agrees very well with BATE's figure 4. The rostrum that reaches nearly to the end of 3rd antennular article, is slightly turned upward, rather slender and somewhat narrowing distally; the upper margin is a little concave, the lower a little convex. The rostrum bears 3 teeth, the foremost tooth is a little farther distant from the penultimate than from the acuminate tip, which is slightly curved downward; the lower margin bears one sharp tooth, that is directed straight forward and situated immediately in front of the foremost tooth of the upper margin and between this tooth of the lower margin and the tip of the rostrum there is still another smaller tooth, immediately below the tip. The post-rostral carina is armed with 5 teeth. The 8 teeth with which the upper margin of carapace and rostrum is armed, are equidistant and gradually decrease in size from the hindmost to the foremost. The carapace which is tomentose and here and there pilose, carries a few wrinkles or ridges. Interrupted wrinkles and a ridge run between the strong hepatic spine and the posterior margin of the carapace, defining the branchial region superiorly, and four or five other longitudinal wrinkles are seen immediately above them on the lower part of the cardiac region; one observes, finally, an oblique wrinkle near the postero-lateral angles of the carapace, that runs nearly parallel with the lower margin.

The abdomen fully agrees with BATE's figure 4, as regards the number and the arrangement of the sharp teeth with which the pleura are beset; I will, however, observe that the elevated parts of the 1st, 2nd and 3rd somite are transversely wrinkled and rugose, and that these wrinkles gradually become less distinct on the following somites. The small oblique tooth on the 1st somite is deeply cleft.

The external maxillipeds, the joints of which are flattened, just reach to the end of the antennal scales. The thoracic legs of the 1st pair bear at the far end of their 2nd and 3rd joints a rather small, sharp tooth, a similar tooth occurs at the base of the 2nd legs, but their 3rd joint is unarmed like also the legs of the 3rd pair. In all the chelate legs the fingers

are one and a half times as long as the palm, but in BATE's figure 4 the fingers of the 1st and 3rd pairs appear not longer than the palm. The legs of the 1st pair extend as far forward as those of the 5th, almost to the middle of the antennal scales, whereas those of the 3rd pair reach with their fingers beyond the tip of the latter.

Sternum armed with a flattened spine arising between the bases of the legs of the 4th pair, the two spines between the legs of the 2nd and 3rd pairs are also distinct.

Remarks. It is doubtful whether DE HAAN's *Sic. cristata* from Japan is identical with this species or not, I will, however, observe that DE HAAN's description is not in accordance with his figure. He describes the pleura of the 1st abdominal somite as unispinose, like in *Sic. lancifer*, but in the figure one observes two spines; the 2nd and the 3rd pleura are described as bispinose, but in the figure the 3rd is armed with three spines. PEARSON (l. c.) regards this species as distinct from *Sic. lancifer*, but his words "the abdomen differs only from that of *Sic. lancifer* in not having pleural spines on each segment" are not in accordance with DE HAAN's description. The male from Japan, described by Dr. ORTMANN, seems to be a true *Sic. lancifer*, perhaps therefore the two species are identical.

General distribution: "Mer des Indes" (OLIVIER); Arafura Sea (SPENCE BATE); Japan, Kagoshima (ORTMANN); Pulau Bidan, Penang (LANCHESTER); Pearl banks, Gulf of Manaar, Ceylon (PEARSON).

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velutinus (Penaeopsis) 9. 55. 69.
velutinus (Pencus) 65.
venusta (Parapenaeopsis) 9. 92. **93.**
villosus (Haliporus) 7. 31.
villosus (Penaeopsis) 8. 55.
virilis (Aristeus) 6. **27.** 29. 30.
virilis (Hemipenaeus) 27.

Woodwardi (Funchalia) 7.

Xiphopenaeus 9.

ADDENDA ET CORRIGENDA.

Page 10. *Penaeus stylirostris* Stimps. has been described in 1871, not in 1874.

Pages 50—53. For "*Sol. siphonocera*" read "*Sol. membranacea*".

Penaeus californiensis Holmes 1900 (not 1901 as indicated on page 10) is considered by Miss RATHBUN in: Proc. U. S. Nat. Mus. Vol. 38, 1910, p. 564, as identical with *Penaeus brevirostris* Kingsley. For this reason *Penaeus californiensis* is not mentioned in the Introduction to the genus *Penaeus*, pages 95—97; it is still indicated in the List on page 10, but this List was already printed, when Miss RATHBUN's paper was received.

The following ought to be still added to the List of Errata:

Page 17, 8th line from below: the anterior prominence of the merus of 2nd maxillipeds measures a little more than one-third the total length of the joint; the joint, indeed, is 4 mm. long, the prominence 1,65 mm.

Page 17, 2nd line from below: *for* "just half as wide" *read* "about just as wide".

Page 23, 10th line from above, *for* "between the 3rd and 4th pairs" *read* "between the 4th and 5th pairs".

Page 25, 2nd line from below: *for* "the chelae are comparatively shorter and less slender" *read* "the chelae are comparatively shorter and less slender, except the chelae of the 1st and 2nd pair, which are just as long as in *Hemip. crassipes*".

EXPLANATION OF THE PLATES.

Twenty three figures have been drawn by Mr. J. F. OBBES of Apeldoorn, Holland; their numbers are: Plate II, Fig. 5 and 6; Plate III, Fig. 10, 10*a*, 10*b*; Plate IV, Fig. 10*c*—10*g*; Plate V, Fig. 12, 12*a*—12*c*; Plate VI, Fig. 18, 18*a*—18*d*; Plate VIII, Fig 24, 24*a*, 27, 27*a*.

PLATE I.

Fig. 1. *Benthesicymus Investigatoris* A. And. Dorsal view of the eye-peduncles and of the anterior part of the carapace of the female from Stat. 161, × 3; 1*a* thelycum of the same specimen, × 6; 1*b* dorsal view of the caudal fan of the same female, × 3.

Fig. 2. *Gennadas Pasithea* de Man, dorsal view of the antennular peduncles with a part of their flagella, of the right scaphocerite, of the eye-peduncles and of the anterior part of the carapace, × 5; 2*a* left scaphocerite, × $8^1/_3$; 2*b* left maxilliped of the second pair, × 6; 2*c* left maxilliped of the third pair, × 6; 2*cc* lateral view of the terminal joint of this maxilliped, × $12^1/_2$; 2*ccc* terminal joint of the same maxilliped, looked at from above, × 17; 2*d*—2*h* the legs of the first to the fifth pair, × 6; 2*i* petasma, the left branch looked at from the outer side, × 15. In the description of this species (p. 18—19) the whole petasma has been described, the two branches taken together; the various parts are therefore here enumerated still once: α one of the two large, triangular, obtuse lobes (of the description), β the narrow tooth or spine, in which the lateral lobe terminates, γ the subacute, depressed, even slightly concave tubercle behind the lateral lobe, δ the posterior and ε the anterior of the two tubercles, situated behind one another at either side of the median line, η the small, compressed, narrow tooth or lobule between these two tubercles; 2*ii* free margin of the large triangular lobe and of the anterior tubercle, more strongly magnified, × 30; 2*iii* two of the microscopical hooks with which the anterior tubercle ε is covered, in a lateral view; 2*iiii* two of these hooks viewed from before, 2*iiiii* some hooks of the foremost part of the large, triangular, obtuse, lobe; the three last figures magnified 160-times; 2*j* thelycum, × 15. With the exception of Fig. 2*j*, all the figures are taken from the male.

Fig. 3. *Gennadas clavicarpus* de Man, lateral view of the carapace etc., of the type specimen, the adult female from Stat. 128, × 6; 3*a* maxilliped of the second pair × $12^1/_2$; 3*b* external maxilliped, × $12^1/_2$; 3*c*, 3*d*, 3*e* legs of the first, second and third pair, × $12^1/_2$ (the figures 3*a*—3*e* all taken from the adult female from Stat. 128); 3*f* posterior view of the petasma of the male, long 23 mm., from Stat. 230, × 25; 3*g* right-half of the petasma of the same male, looked at obliquely from before, × 25.

1
1a
1b
2
2a
2b
2 ivii
2 cc
2 viii
2 ii
2 iii
ε
γ
δ
2d
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2 ccc
α
2 i
β
γ
2 j
2 g
2 h
2 f
3 b
3 g
3.
3 c
3 e
3 a
3 f
3 d

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PLATE II.

Fig. 3*h*. *Gennadas clavicarpus* de Man, left-half of the petasma of the third male, on which one observes, instead of the large, rounded lobe of the distal border, a triangular, pointed process, the acuminate tip of which is curved foreward: posterior surface, × 25; 3*j* thelycum of the type specimen, the adult female from Stat. 128, × 17; 3*k* thelycum of one of the four young females from Stat. 230, long 18 mm., × 25.

Fig. 4*a—c*. *Hemipenaeus crassipes* (W.-Mas.), legs of the first pair (4*a*), of the second pair (4*b*) and of the third pair (4*c*) of the female from Stat. 85, × $1^1/_2$.

Fig. 5. *Hemipenaeus Sibogae* de Man, adult female, type, from Stat. 52, × $1^1/_3$; 5*a* leg of the first pair, 5*b* leg of the second pair, 5*c* leg of the third pair of this female; × $1^1/_2$.

Remarks: The measurements of the legs of the first and of the second pair of the females both of *Hemip. crassipes* (W.-Mas.) and *Hemip. Sibogae* de Man are indicated in the following table, because in the description of *Hemip. Sibogae* (p. 25) not only the carpi but also the chelae of these legs are said to be shorter and less slender than those of *Hemip. crassipes*, which, as regards the chelae, is not the case in these legs:

		Hemip. crassipes	*Hemip. Sibogae*
Length of the merus	of the legs of the first pair	12	12
Width of the merus in the middle		2	2,1
Length of the carpus		13	11
Width of the carpus at the distal extremity		1,5	1,6
Length of the chela		14,5	14,5
Width of the palm in the middle		2	2
Length of the merus	of the legs of the second pair	14	14
Width of the merus in the middle		2,3	2,4
Length of the carpus		16,25	14
Width of the carpus at the distal extremity		1,6	1,8
Length of the chela		18,5	18,5
Width of the palm in the middle		2,25	2,3

Fig. 6. *Aristeus virilis* (Sp. Bate), carapace with the legs etc. of a young male, long 118 mm., from Stat. 38, × 2; 6*a* leg of the third pair of the female from Stat. 262, × $1^1/_2$.

Fig. 7. *Aristeus semidentatus* (Sp. Bate), leg of the third pair of the female from Stat. 262, × $1^1/_2$.

Fig. 8. *Haliporus aequalis* Sp. Bate, thelycum of the larger female from Stat. 262, × 6; 8*a* mandibular palpus of the same female, × 5.

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PLATE III.

Fig. 9. *Haliporus propinquus* de Man, right-half of the petasma of a male, long 76 mm., from Stat. 316, the posterior side viewed at obliquely from behind, × 10; 9*a* left-half of the same petasma, view of the outer side, × 10; 9*b* the two lobules in which the left-half of the petasma terminates, looked at from the outer side, × 25: the larger anterior lobule does not only present an incision at its anterior extremity, by which a small tooth is formed, but a similar tooth exists also at the posterior extremity, the latter tooth, however, was not described in the text; 9*c* thelycum of a female, long 85 mm., from Stat. 316, × 6; 9*d* mandibular palpus of this female, × 5.

Fig. 10 [1]). *Haliporus Sibogae* de Man, adult female, long 160 mm., from Stat. 74, × $1^1/_4$; 10*a* anterior part of the carapace, with the rostrum, the eye, the antennule and the antenna of the same adult female, × 2; 10*b* the carapace with the eyes etc. of the same female, viewed from above, × $1^1/_4$.

1) The three spines on the lateral surface of the carapace are situated a little farther distant from the upper margin than they are in this figure.

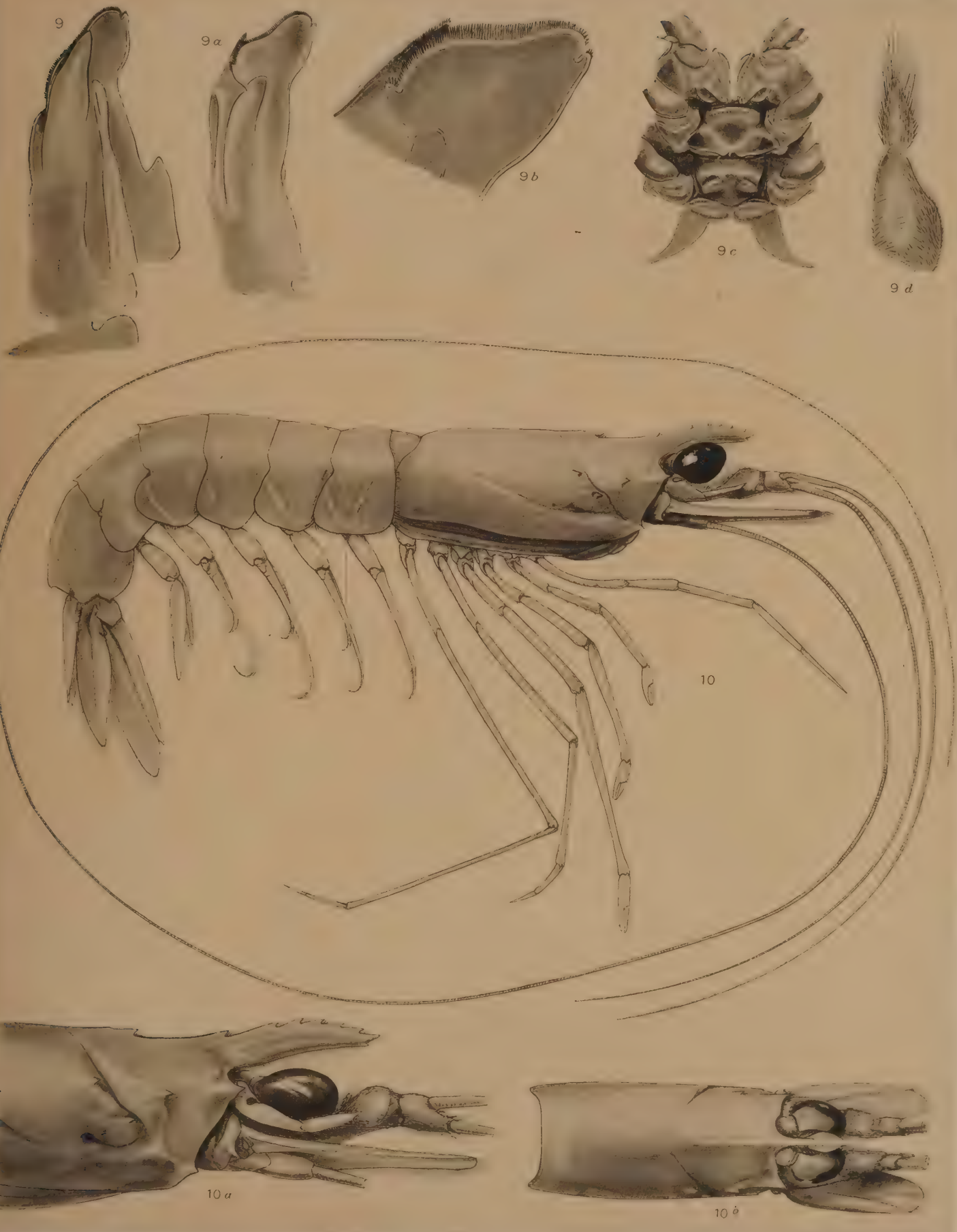

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PLATE IV.

Fig. 10*c*. *Haliporus Sibogae* de Man, the carapace of the male, long 155 mm., from Stat. 74, with the various appendages, viewed from the lower side, × $1^1/_4$; 10*d* anterior part of the carapace of another female from Stat. 74, × 2; 10*e* caudal fan of an adult male from Stat. 74, × $1^1/_2$; 10*f* and 10*g* anterior part of the carapace of two males, long 125 mm., from Stat. 74, × 2; 10*h* sternum of an adult male from Stat. 38, long 150 mm., × 3; *a* left leg of the third pair; 10*i* petasma of an adult male, from Stat. 38, looked at from behind, × 3; 10*j* thelycum of an adult female, long 145 mm., from Stat. 74, where the thelycum appears faintly carinate in the middle line, × 3; 10*k* thelycum of an adult female, long 155 mm., from Stat. 38, in which it appears rhomboid, the two anterior sides making a right angle with one another and separated by grooves from the rest of the sternum, × 3; 10*l* left mandibular palpus of an adult male, long 150 mm., viewed from the outer side, × 4; 10*m* left maxilliped of the first pair of the same male, × 3; 10*n* maxilliped of the second pair of the same male, × 3, *a* the podobranch; 10*o* terminal joint of this maxilliped, × 5; 10*p* maxilliped of the third pair of the same male, long 150 mm., from Stat. 38, × 2; 10*q* the two last joints of the outer footjaw of an adult female, long 155 mm., from Stat. 38, × 2.

Fig. 11. *Solenocera pectinata* (Sp. Bate), distal spiniferous part of the petasma of the male from Stat. 204, looked at from behind, × 25.

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PLATE V.

Fig. 12. *Solenocera Melantho* de Man, adult female, long 125 mm., from Stat. 312, × $1^1/_4$; 12*a* carapace with the eye etc. of this female, × $1^1/_2$; 12*b* the same viewed from above, × $1^1/_2$; 12*c* caudal fan of this female, × $1^1/_2$; 12*d* petasma of the adult male from Stat. 312, looked at from before, × 5; 12*e* petasma of the same male, looked at from behind, × 5; 12*f* left-half of the petasma of the same male, lateral view, × 5; 12*g* distal margin of the anterior and median lobe of this petasma, in a lateral view, × 12; 12*h* the same lobes looked at from behind, × 12; 12*i* right posterior lobe of the same petasma, posterior view, × 12.

Fig. 13. *Solenocera Faxoni* de Man, carapace etc. of the female, type, from Stat. 254, × 2; 13*a* the same viewed at from above, × 2; 13*b* antero-inferior part of the carapace looked at obliquely, in order to show the rounded antero-inferior angle of the carapace, × 3; 13*c*, 13*d* distal extremity of the upper, respectively the lower antennular flagellum, × 25.

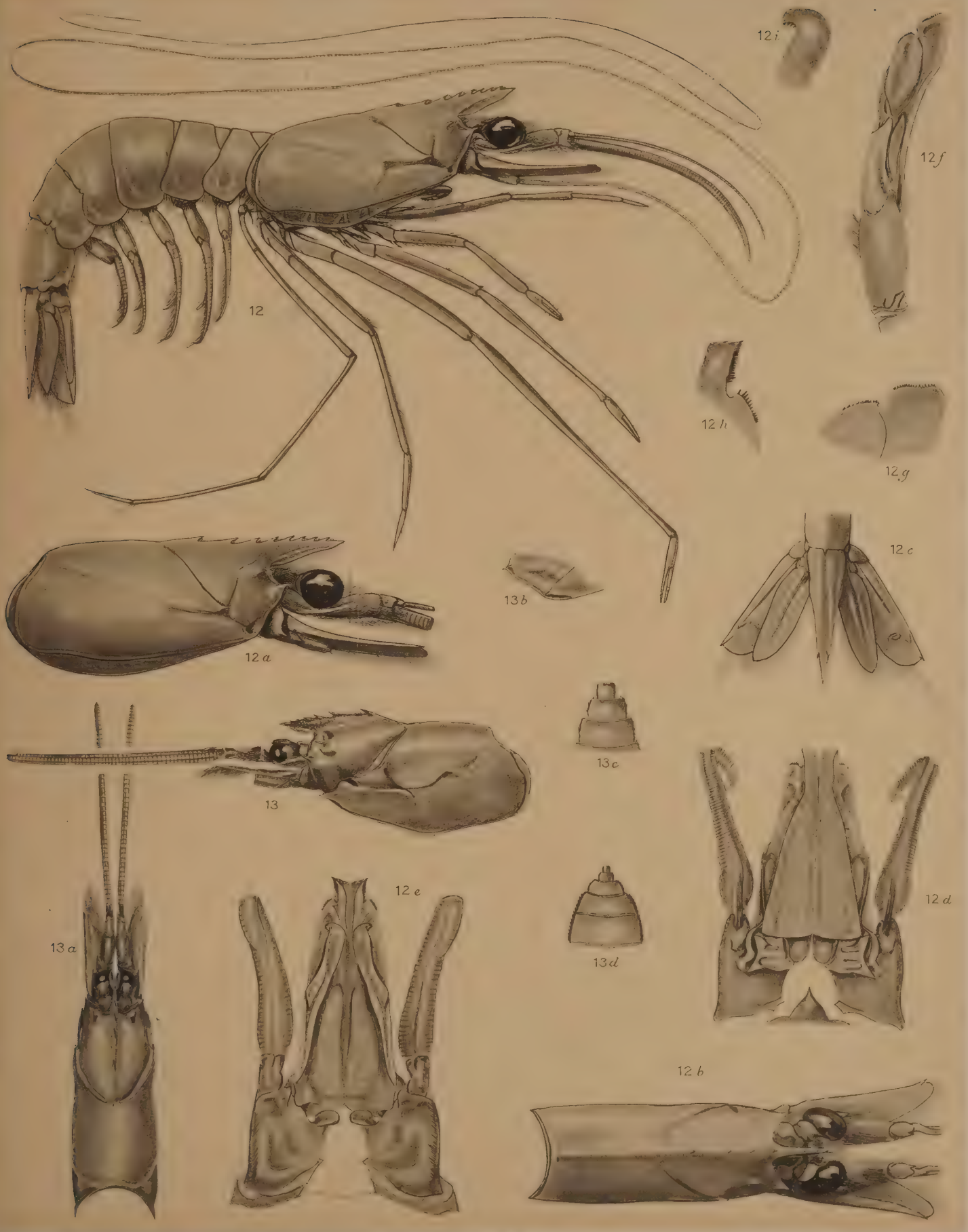

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PLATE VI.

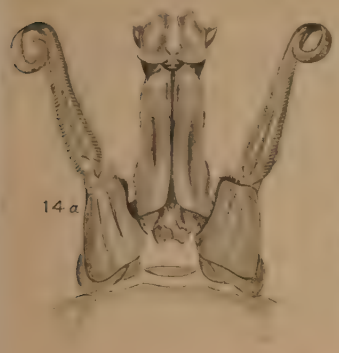
Fig. 14*a*. *Penaeopsis monoceros* (Fabr.), petasma of a male, long 85 mm., from Stat. 47, looked at from behind, × 4; 14*b* distal part of this petasma, × 8; 14*c* thelycum of the adult female, long 150 mm., from Stat. 2, × 3.

Fig. 15*a*. *Penaeopsis affinis* (H. M. Edw.), petasma of the male, long 63 mm., from Stat. 213, looked at from behind, × 4; 15*b* distal part of this petasma, × 8.

Fig. 16*a*. *Penaeopsis elegans* (de Man), right leg of the fifth pair of the male, long 81 mm., × 2; 16*b* ischium and proximal part of the merus of this leg, × 5; 16*c* petasma of this male, looked at from behind, × 5; 16*d* distal part of this petasma, × 10; 16*e* distal part of the petasma of the other male, which is 75 mm. long, also looked at from behind, × 10.

Fig. 17. *Penaeopsis* sp. Thelycum of the female from Stat. 71, × 10.

Fig. 18. *Penaeopsis Sibogae* (de Man), adult male, long 65 mm., from Stat. 306, × 2; 18*a* carapace with the eyes etc. of this male, looked at from above, × 2; 18*b* and 18*c* carapace with the eye etc. of two females, long 70 mm. and 75 mm., from the same Station, × 2; 18*d* carapace of the female, long 75 mm., viewed from above, with the eyes, antennulae and scaphocerites, × 2; 18*e* petasma of an adult male from Stat. 306, viewed at from behind, × 8; 18*f* distal extremity of this petasma, posterior side, × 17; 18*g* distal half of this petasma, anterior side, × 17; 18*h* thelycum of an adult female from the same Station, × 10.

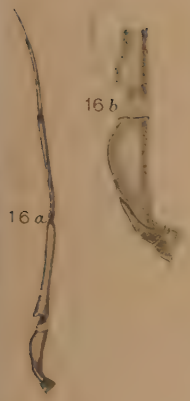

14 a

14 b

14 c

15 a

15 b


16 a

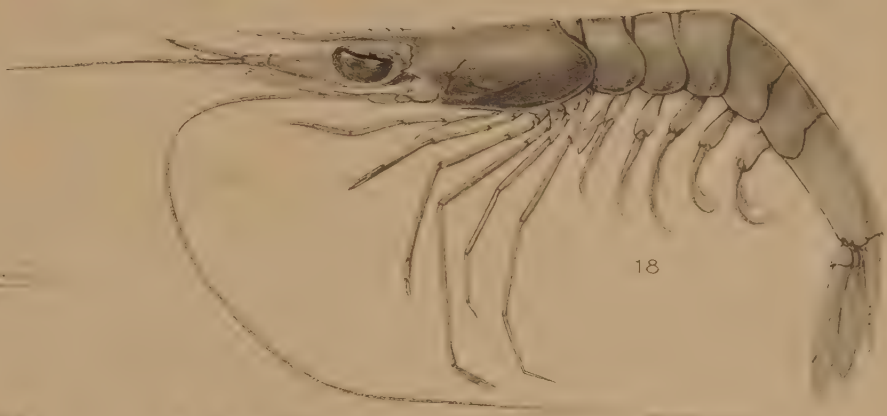
16 b

16 c

16 d

16 e

17


18

18 a

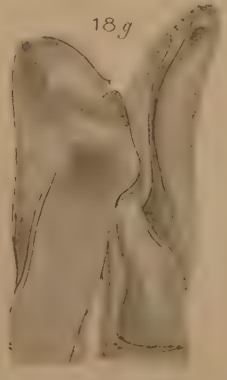
18 b

18 c

18 d

18 f

18 h


18 g

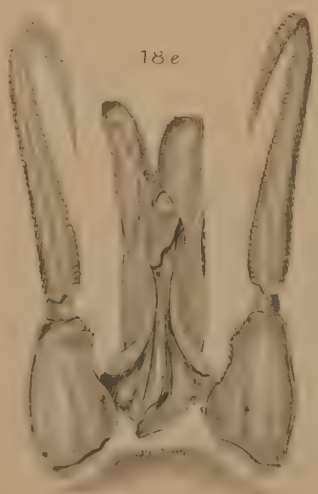

18 e

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PLATE VII.

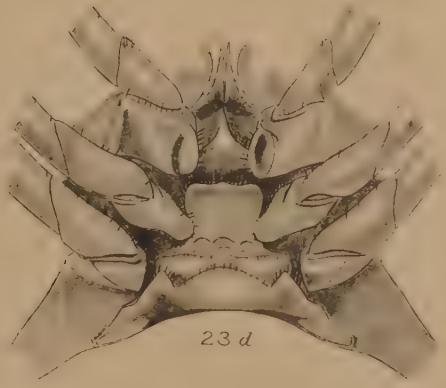
Fig. 19*a*. *Penaeopsis Richtersii* (Miers), anterior part of the body of the female from Stat. 240, in a lateral view, × 6; 19*b* dorsal view of the same, × 6; 19*c* rostrum, × 12.

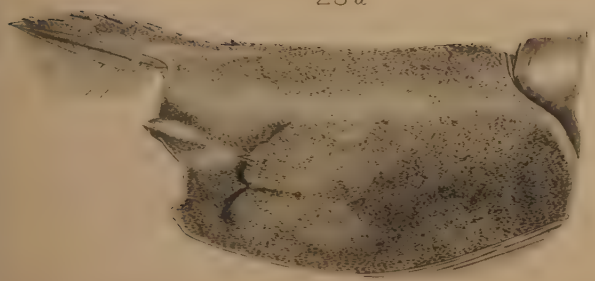
Fig. 20*a*. *Penaeopsis stridulans* (W.-Mas.), thelycum of the female from Stat. 320, × 5; 20*b* thelycum of the female from Stat. 296, × 5.

Fig. 21. *Penaeopsis distinctus* (de Man), thelycum of one of the two females from Stat. 184, × 8.

Fig. 22*a*. *Penaeopsis* sp. (Siboga-Penaeidae, p. 70), petasma of the larger male, long 45 mm., from Stat. 273, viewed from behind, × 8; 22*b* base of the petasma of the other male, long 40 mm., from the same Station, also looked at from behind, × 10; 22*c* thelycum of a female, long 60 mm., from Stat. 240, × 8; 22*d* the two, divergent, median teeth between the legs of the fourth pair, × 25.

Fig. 23*a*. *Penaeopsis quinquedentatus* (de Man), carapace of the male, long 45 mm., from Stat. 109, × 6; 23*b* sixth abdominal somite of this male, × 3; 23*c* petasma of the same male, viewed from behind, × 10; 23*d* thelycum of a female, long 40 mm., from Stat. 240, × 10.





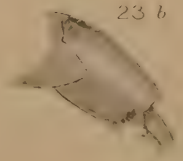


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PLATE VIII.

Fig. 24. *Penaeopsis Borradailei* de Man, the female from Stat. 193, long 53 mm., × 3; 24*a* carapace of this female, with the eyes, the antennulae and the scaphocerites, looked at from above, × 3; 24*b* thelycum of the female from Stat. 193, × 10.

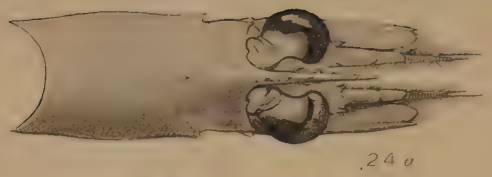
Fig. 25*a*. *Parapenaeus fissurus* (Sp. Bate), carapace and rostrum of an adult male, long 115 mm., from Stat. 302, × $1^1/_2$; 25*b* carapace and rostrum of an adult female, long 120 mm., from the same Station, × $1^1/_2$.

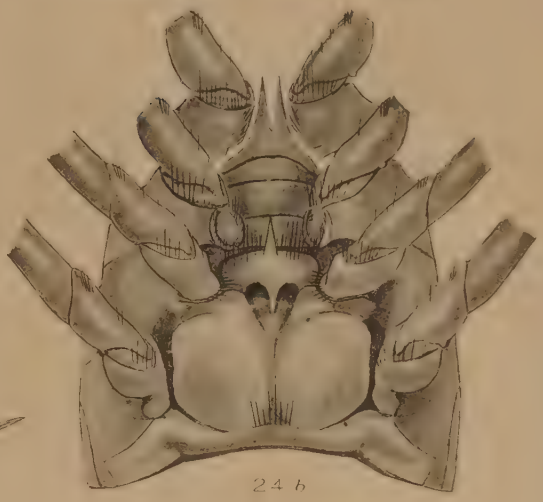
Fig. 26*a*. *Parapenaeus rectacutus* (Sp. Bate), telson of the male, long 127 mm., from Stat. 12, × 2; 26*b* petasma viewed from behind, × 3; 26*c* left side of the petasma, looked at obliquely from before, × 3.

Fig. 27. *Atypopenaeus dearmatus* de Man, adult female, 58 mm. long, from Stat. 312, × 2; 27*a* carapace of this specimen with the eyes, the antennulae and the scaphocerites, viewed from above, × 2; 27*b* anterior part of the carapace of an adult female from Stat. 312, × 5; 27*c* petasma of the male from the same Station, viewed from behind, × 10; 27*d* distal part of this petasma, posterior view, × 25; 27*e* thelycum of the female, long 72 mm., from Stat. 302, × 8.

Fig. 28. *Trachypenaeus anchoralis* (Sp. Bate), thelycum of the larger female, long 58 mm., from Stat. 51, × 10.

24


24a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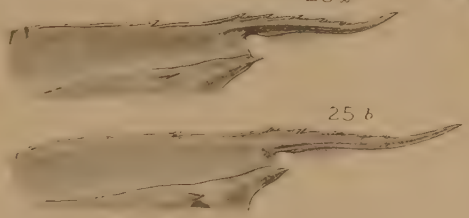

25a

25b

26a

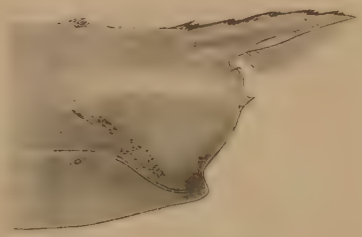
26b

21

26c

27a

27d


27b

28

27e

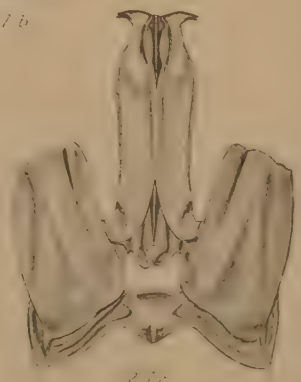

27c

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PLATE IX.

Fig. 29*a*. *Trachypenaeus salaco* de Man, petasma of the male, long 42 mm. from Stat. 205, viewed from behind, × 10; 29*b* distal part of this petasma, viewed from the left side, × 10; the convex anterior surface is situated at the left hand of the figure; 29*c* the same petasma looked at from above, × 10, *a* being the posterior side of the organ.

Fig. 30. *Parapenaeopsis venusta* de Man, larger female from Stat. 273, × 3; 30*a* anterior part of the carapace of the other female, × 6; 30*b* telson of the larger female, × 6; 30*c* thelycum of the larger female, × 12.

Fig. 31*a*. *Penaeus semisulcatus* de Haan, petasma of the male, long 175 mm., from Stat. 213, looked at from behind, × 4; 31*b* flagella of the right antennule of the same specimen, viewed from above, × 2.

Fig. 32*a*, 32*b*. *Penaeus indicus* H. M. Edw., var. *longirostris* de Man, left leg of the first respectively second pair of the largest female, long 165 mm., from Stat. 213, looked at from the outer side, × 2.

Fig. 33*a*. *Penaeus merguiensis* de Man, carapace of a young female, long 92 mm., from Stat. 47, × 2, in which the foremost tooth of the upper margin appears distinctly situated before the third joint of the antennular peduncle; 33*b* and 33*c* left leg of the first and of the second pair of an adult female from Makassar, looked at from the outer side, × 2.

Fig. 34*a*. *Penaeus canaliculatus* Oliv., thelycum of the adult female, long 137 mm., from Stat. 133, × 6; 34*b* thelycum of the young female, long 60 mm., from the same Station, × 6.

Fig. 35*a*. *Penaeus latisulcatus* Kish., thelycum of the almost adult female, long 135 mm., from Japan, × 5; this female, which is preserved in the Museum at Göttingen, was erroneously referred by W. Hess to *Penaeus plebejus* Hess.

Fig. 35*b*. Thelycum of a young female, long 110 mm., from Djeddah, × 10. This female, which is preserved in the Leyden Museum, and which in 1880 was referred by me to *Penaeus canaliculatus* Oliv., does apparently also belong to *Penaeus latisulcatus* Kish.

Fig. 36*a*. *Penaeus plebejus* Hess, thelycum of the type of this species from Sydney, nearly 15 cm. long, and preserved in the Museum at Göttingen, × 5; 36*b* anterior prominence of this thelycum looked at from before, × 5.

Fig. 37. *Sicyonia benthophila* de Man, the female from Stat. 253, type, × 5; the third legs are wanting and the very fine setae with which the carapace is covered, have not been figured; 37*a* anterior part of the carapace with the eye and the stylocerite, × 17; 37*b* the cordiform plate of the thelycum, at either side of which one observes the coxae of the fourth pair of legs, × 17; 37*c*—*e* the legs of the first, fourth and fifth pair, × 10.

Fig. 38. *Sicyonia fallax* de Man, female from Stat. 105, × 2; 38*a* upper side of the carapace and the rostrum, × 5; 38*b* sixth and fifth abdominal somite, with a part of the fourth, × 5; 38*c* thelycum, × 10.

29 a
29 b
29 c
30
30 a
30 b
30 c
31 a
31 b
32 a
32 b
33 a
33 b
33 c
34 a
34 b
35 a
35 b
36 a
36 b
37
37 a
37 b
37 c
37 d
37 e
38
38 a
38 b
38 c

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PLATE X.

Fig. 39. *Sicyonia rectirostris* de Man, female from Stat. 193, type, × 4; 39*a* upper part of the carapace with the rostrum, × 10; 39*b* thelycum, × 17, *z* the legs of the fifth pair; 39*c* left leg of the first pair, × 10.

Fig. 40. *Sicyonia parvula* de Haan, young female from Stat. 164, long 17 mm., × 5; 40*a* upper side of the carapace, with the rostrum, of another female of the same size, from the same Station, × 10; 40*b* distal part of the rostrum of this female, × 50; 40*c* right antennular peduncle with the surrounding organs, of this female, × 25; 40*d* right leg of the first pair of this female, × 10; this leg shows a stouter shape than that of *Sic. rectirostris*.

Fig. 41. *Sicyonia laevis* Sp. Bate, carapace with the rostrum of the young female from Stat. 184, × 10; 41*a* distal extremity of the rostrum, × 25; 41*b* right leg of the first pair, × 10.

Fig. 42. *Sicyonia bispinosa* de Haan, carapace of the young male from Stat. 99, × 10; 42*a* extremity of the rostrum, × 50; 42*b* right antennular peduncle with the eye and the scaphocerite, × 25; 42*c* left leg of the first pair, × 10.

Fig. 43. *Sicyonia ocellata* Stimpson. Thelycum of the female, from Stat. 301, × 25.

Fig. 44. *Sicyonia trispinosa* de Man, carapace of the male from Stat. 37, × 10; 44*a* distal part of the rostrum of the female from Stat. 51, × 50; 44*b* first and second abdominal somite of the male, × 5; 44*c* petasma viewed from behind, × 50; 44*d* right antennular peduncle etc. of the male, × 25; 44*e* left leg of the first pair of the male, × 10.

Fig. 45. *Sicyonia carinata* Olivi = *sculpta* H. M. Edw., orbital angle of a female, long 62 mm., from the gulf of Naples, × 10; 45*a* right antennular peduncle etc. of this female × 10.

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